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VIEWS, NEWS AND INTERVIEWS.

With the aid of a radiograph a bullet was recently removed from the body of a man at the S. R. Smith Infirmary, New Brighton, S. I., and what was expected to be a very dangerous surgical operation was transformed into a very simple one. It is asserted that this is the first instance where the X rays have been successfully employed in surgery to locate an object in the neighborhood of the abdominal cavity. The person operated upon was William McAlarney, who was shot in a quarrel. The bullet passed in at the back, through the eleventh rib, and its course was traced through the left kidney and then it was apparently lost in the abdomen. Efforts were made by the surgical staff of the hospital to locate the ball, but they were unsuccessful. It was deemed necessary to remove the bullet in order to save the life of the wounded man, who was sinking, and the only means seemed the dangerous operation of laparotomy. Mr. Max Osterberg, of New York city, was called upon to make a radiograph of the bullet in the man's body. When the negative was developed the bullet was plainly seen at the left of the spinal column, on a level with the second lumbar vertebra. With the plate as a guide, the bullet was successfully removed. It was only necessary to make a small incision behind the left kidney to a depth of about four inches, and the bullet was lifted from its resting place against the side of the spinal column. An abscess had formed about it which would have resulted fatally in a few days. The bullet, which was of 32 caliber, was almost perfect in shape. Its lodging place was a surprise to the surgeons. It had been deflected at almost a right angle from its course in entering the back.

It is understood that negotiations are under way in London for sale of Montana and allied copper mines to a syndicate of English and German capitalists. Lewisohn, of New York, is said to be conducting the negotiations in London in person.

William Haas was to have been put to death soon after midnight of April 7 in the penitentiary at Columbus, Ohio, for the murder of Mrs. William Brader at Courdale on July 3 last. It was to have been Ohio's first electrical execution. All preparations had been made for the execution, and Haas expected to die. While making a final test of the apparatus on April 6 one of the armature coils was burned out, although the voltage was not nearly so high as in former tests. The prisoners who had charge of the dynamo room are suspected of tampering with the machine, but they deny it. Governor Bushnell decided to reprieve Haas until April 21.

A bill will be introduced in the New York State Legislature providing for an extension of the life of the Board of Electrical Control of New York city for four years. The existence of the present board is to terminate on November 1, 1897. There is a bill already on its way through the legislature to extend the term one year from that date, but it is said that it will really only operate to extend the life of the board two months, or until the Greater New York charter goes into effect. This bill, it seems, is not an amendment to the Greater New York charter. The bill that is to be introduced will be. There are three Subway Commissioners, who receive a salary of $5,000 a year each, which is contributed by the electrical companies which use the subways.

Mrs. Catharine Quinn sued the Nassau Electric Company, of Brooklyn, N. Y., for $10,000 damages for injuries received as the result of an unusual accident. While riding in a trolley car Mrs. Quinn was struck a glancing blow on the head by the fare register, which dropped from its fastenings. She recovered $6,000.

American Institute of Electrical Engineers.

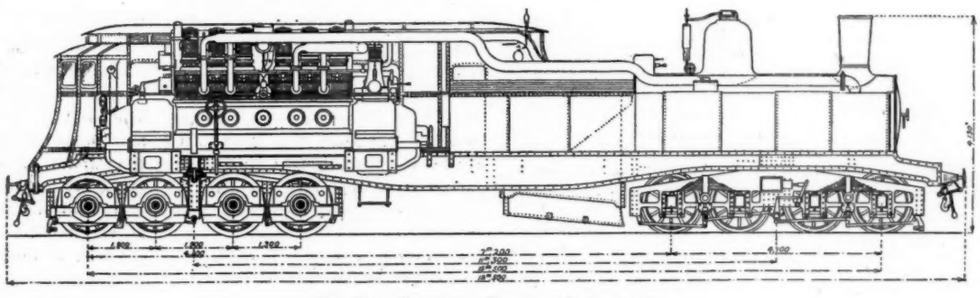
The 115th meeting of the institute will be held at 12 West Thirty-first street, New York city, on Wednesday, April 21, 1897, at eight o'clock P. M. A paper will be presented by Dr. A. C. Crehore and Lieut. Geo. O. Squier, entitled "The Synchronograph; A New Method of Rapidly Transmitting Intelligence by the Alternating Current". The paper will be illustrated by lantern slides.

A meeting of western members will be held at the Armour Institute, Thirty-third street and Armour avenue, Chicago, at the same date and hour (April 21, 8 P. M.), where the paper will be read by Dr. Frederic Bedell.

The next meeting of the institute will be the annual meeting for the election of officers, the reception of the yearly report, etc., which will be held at 12 West Thirty-first street, New York city, May 18. The general meeting for the reading and discussion of professional papers will be held at Greenacre-on-the-Piscataqua, Eliot, Me., beginning July 26.

The New Heilmann Electric Locomotive.

The first Heilmann locomotive was tested in 1893 and 1894 on the Western French Railway, between Havre and Beuzeville, and between Paris and Mantes. The boiler was of the Lenz type, with 289 tubes, nine feet six inches long. The horizontal compound steam engine was of the Brown pattern and double acting. To this a C. E. L. Brown six-pole dynamo with a smooth ring armature was coupled. This machine was separately excited, and had an output of 1,024 amperes at 400 volts. Four-pole C. E. L. Brown motors were used, which had a torque of 281 pounds, and, at 400 volts and 128 amperes, a speed of 410 revolutions per minute. The motors—eight in number — were series-wound, and their armatures were toothed. The carriage itself rested on two bogies, each having four axles. Its length from buffer to buffer was 53 feet six inches, and its over-all wheel-base 38 feet six inches.



THE NEW HEILMANN ELECTRIC LOCOMOTIVE.

From the above figures it will be seen that this locomotive was rather less powerful than an ordinary steam locomotive. It was, in fact, capable of giving a normal traction effort of 2,870 pounds at the rims, or at full speed (62 miles an hour), about 1,100 pounds at the draw-bar. In other words, it could draw on the level a train weighing from 70 to 80 tons, at a speed of from 56 to 62 miles an hour. The machine had only been built as an experiment, and it was in no way intended to make it an engine of exceptional power. The following were the general results of the tests: The stability, as far as the locomotive itself was concerned, was independent of the speed. It was only the condition of the permanent way that seemed to influence it. This was to be expected as a consequence of the perfect balancing of the parts, which is difficult to effect on ordinary

locomotives. As regards economy, it was found that the double transformation of energy consumed about 15 per cent of the indicated horse-power; but this was more than compensated for by the more economic utilization of the steam. Thus, trains weighing 65 tons were drawn with a coal consumption of less than four kilogrammes per kilometre (14.2 pounds per mile). The engine was allowed to work as far as possible with constant admission, and the regulation of the current supplied to the motors was effected by varying the field of the generator.

These tests, which were made over a distance of more than 1,200 miles, showed several points where improvements could be made. It was, therefore, decided to build two new locomotives; these, which were designed by MM. N. Mazen and G. Damoiseau, present the same general features as the first one; but their total power, as well as their "specific power", have been considerably increased. This increase of specific power has been effected: 1. By the substitution of a locomotive boiler for the Lenz boiler. 2. By the use of more compact electrical apparatus and generators, with toothed armatures. 3. By a more careful study of the question of weight, says the London *Electrician*, from which this article is taken.

The double-acting engine has been replaced by a single-acting engine, without a decrease of its specific power, although it is true that the initial pressure has been increased a sixth and the speed about a third. The boiler is of the ordinary locomotive type, with a Belpaire furnace. The boiler is of iron, the furnace being of copper, and it has the following dimensions:

Heating surface of furnace	177	square feet.
" " tubes	1,817	"
Total	1,994	"
Number of tubes	351	"
Length of tubes	12 feet 6 inches.	
Grate area	86	square feet.
Pressure	200 lbs. per sq. in.	

The boiler is fed by two Friedmann injectors. The main engine is a compound six-crank engine. The employment of six lines of moving parts, proposed at the same time by Mr. Mark Robinson and M. Mazen, insures a practically perfect equilibrium. In an engine with cranks at 120 degrees, the sum of the vertical forces due to the inertia of the pistons, piston rods, connecting rods, etc., is practically 0 at any instant; but there is a resultant couple, as the three forces act along different axes. If a second exactly similar engine be juxtaposed, this couple is balanced by another of equal moment. Thus, the cranks are set at 0 degree, 120 degrees, 240 degrees, 240 degrees, 120 degrees and 0 degree. The engine has been built by Messrs. Willans & Robinson. It follows the same lines as the ordinary Willans engine, except in one particular—the distribution, instead of being central, is effected by three cylindrical valves placed at the side and worked from a special shaft driven by spur gearing from the main shaft. The following figures are given:

Indicated horse-power	1,350
Speed	400 revs. per min.
Diam. of high-pressure cylinder,	11.8 inches
Diam. of low-pressure cylinder,	18.9 inches
Stroke	15.7 inches

The engine is coupled direct to two continuous-current dynamos, one on each side, the armatures serving as flywheels. The dynamos have each an output of 910 amperes at 450 volts. The generators are by Messrs. Brown, Boveri & Company; they are of the six-polar type, with cast-steel magnets, toothed-drum armatures and carbon brushes. Except for some ventilating holes, they are completely incased. The two generators are in parallel, and they are also excited in parallel by a machine driven by a separate Willans engine. The motors are four-polar and of the iron-clad type. The armature (a tooth-drum) is mounted on a hollow shaft, concentric with the axle of the locomotive wheels, so that the latter can follow the inequalities of the permanent way without carrying the armature with it. This method of protecting the latter from the shocks, which are inseparable at high speeds, insures the preservation of the insulation. The connection between the hollow shaft of the motor and the axle of the locomotive is effected by three double-steel springs placed between the arms of one of the wheels. The motors are series-wound. The regulating gear is duplicated, so that the locomotive can be controlled from two points—one on the fore part of the engine, and the other near the front of the boiler. At each of these places are the usual apparatus (brake, whistle, etc.), a double rheostat in the exciting circuits and a wheel to actuate the apparatus for controlling the speed of the steam engine. The switchboard is placed on one wall of the cab. Below the board is the reversing gear, which consists of a multiple switch, by means of which the connections of the motor armatures are reversed.

The whole generating plant is borne on a steel frame, resting on two four-axled bogies. The back part is covered in with a sheet-iron case, tapering down to a point at the end. The following are the main dimensions:

Length from buffer to buffer	61 feet
Over-all wheel-base	50 feet 6 inches
Wheel-base of one bogy	13 feet 5 inches
Diameter of wheels	3 feet 10 inches

The illustration on page 181 is an elevation of the locomotive, with part of the cab removed.

One of these two locomotives underwent some preliminary trials last January, but speed tests have not yet been made. The indicated horse-power of the steam engine is 1,350 horse-power. Its mechanical efficiency is 90 per cent. The commercial efficiency of the generators is 95 per cent, not including excitation. Thus, with about 1,370 indicated horse-power from the two steam engines, 1,154 horse-power should be recovered at the terminals of the generators. The efficiency of the motors is 90 per cent, and, assuming a loss of two per cent in the cables, the power at the rims should be 1,154 by 0.98 by 0.90 = 1,006 horse-power. This corresponds to a total efficiency of $\frac{1,006}{1,370}$, or 73.4 per cent at full load.

The power absorbed by the locomotive itself can easily be calculated, and it is easy to deduce from it the efficiency of the locomotive as an apparatus for traction; that is to say, the relation between the power available at the drawbar and the indicated horse-power of the cylinder. This efficiency naturally varies with the profile of the line, the weight of the machine, the speed, etc. Assuming that the locomotive is running at full load on the level, at 100 kilometres (62 miles) an hour, with a total weight of 132 on the locomotive (this weight assumes that the engine, which weighs about 120 tons, is followed by a tender which can carry 20 tons of water, that this stock is half exhausted), the effective horse-power absorbed by the machine would be 342, and hence the power available at the drawbar would be 1,006 — 342 = 664 horse-power. The efficiency of the locomotive is then $\frac{664}{1,370}$ = 48.4 per cent. Six hundred and sixty horse-power at the drawbar should draw 250 tons of ordinary rolling stock (or 350 tons of rolling stock on bogies) at 62 miles an hour.

Forest City Electric Company Visited by Fire.

During the night of April 12 a fire, which at first threatened to be serious, broke out in the plant of the Forest City Electric Company at Cleveland, Ohio. A large quantity of belting, pulleys, etc., was destroyed, and the building was considerably damaged. Fortunately the machinery escaped harm. With commendable promptness the company had its plant again in running order within a few days, and will run it day and night, if necessary, in order not to disappoint its many customers, whose orders are on file. The Forest City Electric Company manufactures the well known roll-drop commutator bars and other electrical specialties.

Extensive Conduit Work in St. Louis.

The National Conduit and Cable Company, of New York, will put in a new mill in St. Louis, with a capacity of 20,000 feet of conduit per day. This company has secured contracts with the high-tension current electric companies of St. Louis, aggregating in amount $350,000. The new works will be installed at once and manufacture will promptly begin.

The extensive conduit and cable factories of this company at Hastings-on-the-Hudson are very busy filling orders, and the energetic staff of the company are thoroughly satisfied that there is a decided improvement in the business of this country.

Telephone Conversations as Evidence.

Judge Bundy made a ruling at Anderson, Ind., on April 12, which is said to be the first of its kind rendered in the United States. During the hearing of an accounting case the defendants sought to introduce as evidence a conversation held over the telephone between the parties to the litigation. Objection was raised, and the court ruled in favor of the defendants, saying: "I find this point has never been ruled upon. I think it is time that a precedent were established. I now admit the legality of the telephone, and the conversation will be permitted to go in as evidence." The testimony in question is of vital importance in the case.

Railway Contracts Awarded.

The General Electric Railway Company, of Chicago, Ill., it is announced, has awarded the contracts for building six miles of its lines south of Thirty-first street. Active work will begin in a few days.

ELECTRIC LIGHT FLASHES.

George H. Greeley has been elected treasurer of the Plymouth, N. H., Electric Light Company.

The Citizens' Electric Light Company, of Appleton, Wis., has sold its property to the Appleton Electric Light and Power Company, the consideration being $25,000.

The Consolidated Electric Light Company, of Birmingham, Ala., is putting in another railroad generator of 500 horse-power, which weighs over 12,000 pounds. The foundation has been made, and consists of 100,000 bricks.

The earnings for March of the Edison Electric Illuminating Company of New York, including the high-tension systems, were as follows:

	1897.	1896.	Increase.
Gross	$207,870 47	$184,156 64	$23,713 83
Net	94,418 93	78,494 81	15,924 12
Gross, three months	660,973 48	597,559 41	63,414 07
Net, three months	324,970 06	278,784 38	46,185 68

At a special meeting of Mechanic Falls, Me., Electric Light and Power Company, the following officers were elected: President, S. S. Waterhouse; treasurer, L. A. Moulton; clerk, F. O. Purington; manager, H. T. Sands. Directors, S. S. Waterhouse,, L. A. Moulton, F. O. Purington, H. C. Rowell, Hon. P. Bonney.

A bill has been filed in the Chicago, Ill., Superior Court to enjoin the trustees of the town of Cicero from making an appropriation to pay the Cicero Water, Gas and Electric Light Company $20,000 for water for fire protection during the next year. The bill was filed by James J. McCarthy, who sues as a taxpayer and resident of the town.

The completion of the power house of the People's Light and Power Company at Orange, N. J., was rushed last week to the utmost possible limit. Eight arc lights and a large number of incandescent lights, attached to flexible cords, were in use all the week for the night shift, and the experts worked right through to 11 o'clock at night, in order to hasten the completion of the plant.

At the annual meeting of the stockholders of the Electric Light and Power Company, of Coaticook, P. Q., the following gentlemen were elected directors of the company: H. Lovell, P. T. Baldwin, J. H. Morgan and W. L. Shurtleff. At the meeting of the directors held subsequently, H. Lovell was elected president and treasurer; W. L. Shurtleff, secretary, and F. E. Lovell, managing director.

At the second annual meeting of the stockholders of the People's Electric Light and Power Company, of Essex Junction, Vt., the following directors were elected for the ensuing year: C. G. Williams, S. A. Brownell, M. A. Bingham, William B. Johnson, E. M. Whitcomb, F. W. Sibley, William Fletcher. From their number they elected C. G. Williams, president; M. A. Bingham, vice-president; F. P. Sawyer, treasurer, and J. H. Burke, clerk.

American Motor Starting Rheostat.

The American Rheostat Company, McGeogh Building, Milwaukee, has more orders on hand than it can conveniently fill without having the shops run overtime, which is now being done, reports Mr. J. Gilbert Hickcox, secretary of the company. At the annual meeting of the company, last week, the following officers were elected: Frank R. Bacon, president; Frank E. Herdtman, vice-president, and J. Gilbert Hickcox, secretary and treasurer. The company manufactures a new and improved line of automatic rheostats for all purposes, which not only are very simple in construction, but embody special features of excellence peculiarly their own. One of the strongest features in the company's apparatus consists, it is said, in the peculiar construction and arrangement of the automatic release, as well as of the break, in which all arcing of contacts is absolutely avoided, doing away with the

American Motor Starting Rheostat.

troublesome fusing of contacts or damage to their support, so frequently a source of annoyance and trouble. The accompanying illustration gives an excellent idea of the general appearance of the company's devices.

Novel Wire Stretching Device.

We illustrate herewith a new and novel wire stretcher, or "come-along", which will be of interest to every construction man. It is called the "Cleveland" come-along, and consists of only two pieces of malleable iron. It does away with all springs, screws, eccentrics, etc., yet is claimed to be the most positive in clamping and easiest to release of any clamp heretofore introduced.

It is made in two sizes, the No. 1 for wires of a larger gauge than No. 8, and the No. 2 for No. 8 wire, or smaller wires. The illustration shows the No. 2, but the principle is the same in both sizes.

It consists of a wedge-shaped piece, having an eye at its smaller end for attaching the rope. This wedge-shaped piece slides in a flattened tapering sleeve, having an opening to one side to admit the wire; the edge of the wedge-shaped piece next the opening in the sleeve is grooved to fit the wire and is parallel to the adjacent wall of sleeve, so that, as the wedge-shaped piece is drawn towards the small end of the tapering sleeve, the wire is clamped the whole length of the sleeve and held positively as long as the tension is maintained. On releasing the tension and giving the sleeve a slight blow at the small end, the clamp is instantly released.

These come-alongs are made with copper faces for use with hard-drawn copper lines. The well known house of J. H. Bunnell & Company, of New York, are the sole agents, and these "come-alongs" may be seen at their Cortlandt street house.

Novel Wire Stretching Device.

DEATH OF J. J. STORROW.

THE EMINENT PATENT LAWYER EXPIRES SUDDENLY IN WASHINGTON, D. C.

Mr. J. J. Storrow, the eminent patent lawyer, of Boston, dropped dead of vertigo in the Congressional Library at Washington, D. C., on April 15. He was visiting Washington for the day, having left his family at Old Point Comfort, Va., on their return from Florida.

Mr. Storrow had been identified with Bell telephone patent litigation from the commercial inception of the telephone. He had the remarkable record of never having lost a patent suit.

James Jackson Storrow was born in Boston on July 29, 1837. He was graduated from Harvard College in 1857, and soon after began to study law with Elias Merwin. In March, 1858, he entered the law school at Cambridge, where he remained for one year. He was admitted to the bar in March, 1860. He was married twice and leaves a widow and three children.

Mr. Storrow took an important part in the proceedings incident to the arbitration treaty between the governments of Great Britain and Venezuela for the settlement of the boundary line dispute. He was appointed special counsel by the Venezuelan Government to represent it, and his brief was considered one of the clearest and best presentations of the boundary question that was prepared.

Mr. Storrow's body was removed to Boston on Friday last, and the funeral was held from his late residence on Monday of this week.

The "Glad Hand".

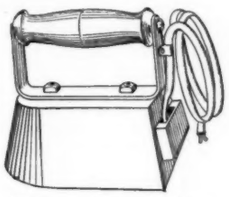
One of the most fetching specialties of the season is the "glad hand", illustrated herewith. It is the Davis indicating globe, manufactured by the Phœnix Glass Company, 42 Murray street, New York city, manufacturers of electrical glassware. The globe is 11 inches long, and fits

The "Glad Hand."

a holder three and one-quarter inches in diameter. It is designed to slip over an incandescent lamp, and makes a most effective and silent guide. The globes are made in opal, ruby or flesh tints with clear letters, showing words such as "elevator", "office", "fire escape" and "stairs". The "glad hand" has been on the market but a short time, and has already made such a favorable impression on the trade, as to indicate that it will be one of the most popular specialties of the year.

An Electric Hatter's Iron.

The illustration herewith shows the conventional form of electric hatter's iron with polished sides and is used



Electric Hatter's Iron.

in many of the large retail establishments throughout the country, as well as by manufacturers. It is perfectly clean at all times and heats quicker than by any other means, effectually doing away with leaky gas connections and other objectionable features incident to the older methods of heating. It is made for all lighting voltages by the American Electric Heating Corporation, of Boston.

Selective Signal Telephone System.

The New York & New Jersey Telephone Company has now in operation in Montclair, N. J., the "selective signal" system of telephones, which is proving a great convenience, and which will, no doubt, in the near future be installed in Orange, and certainly in East Orange, as soon as the conduits and lines are built in that township.

TELEPHONE NEWS AND COMMENT.

The annual meeting of the New England Telephone and Telegraph Company will be held in New York on Monday, May 3, at 11 A. M.

The Erie Telegraph and Telephone Company made a net gain of 432 subscribers in March, and 795 since January 1. Total number connected April 1, 22,184.

The annual meeting of the Mexican Telephone Company will be held in New York, May 12, for the election of seven directors. Stockholders of record April 21 are entitled to vote.

A mortgage for $750,000 on all the property of the Iowa Telephone Company, to the Illinois Trust and Savings Bank of Chicago has been filed. The purpose is to raise funds to extend and improve the property and construct a long-distance line to New York.

The Bell Telephone Company, of Buffalo, is sending out a very neat memorandum book, containing a map of the territory in the northern part of New York State, covered by the exchanges and toll lines of the company. The toll lines are all marked, showing the exact route they follow. The map is one that will be especially appreciated by bicyclists and tourists, as it shows all the roads and distances between towns. The ELECTRICAL REVIEW is indebted to Dr. John N. Culbertson, general superintendent of the Bell company, for a copy of the book.

The Drawbaugh Telegraph and Telephone Company is asking councils for permission to enter into competition with the present telephone company in Philadelphia. The ordinance will be presented to councils with a letter from Col. Joseph Stokes, president of the company. The bill as drafted asks for only such rights and privileges as, in the judgment of practical electricians, are absolutely essential to the success of a system in a city of the extent of Philadelphia. The bill offers to the municipality an entirely free service, while its conditions assure to the citizens exemption from inordinate annual charges for service.

The construction by the American Telephone & Telegraph Company of a line from Chicago to St. Paul, to be completed by next September, is part of a scheme involving considerable extensions of telephone service in the West and Northwest. The line now under construction is to have a number of branches, to be operated in connection with the Wisconsin Telephone Company's system. Other lines to be built shortly will extend from Davenport, Iowa, to Omaha, and from St. Louis to Sedalia, completing a link necessary to establish telephonic communication between Kansas City and the East. The Chicago-St. Paul line will be 450 miles long and will cost $200,000.

SUBMARINE TELEGRAPHY.

ABSTRACT OF THE INAUGURAL ADDRESS OF SIR HENRY MANCE, PRESIDENT OF THE INSTITUTION OF ELECTRICAL ENGINEERS, LONDON.

(Continued from page 178.)

The life of a submarine telegraph engineer is somewhat of a Bohemian character—half a landsman, half a sailor, sometimes working almost continuously day and night for weeks together, at other times enjoying long periods of enforced idleness. The localities chosen for cable stations are frequently isolated and uninteresting, the climate indifferent and the life monotonous. A more desolate place than Mussendom, near the entrance of the Persian Gulf, it would be difficult to imagine; a small island in a land-locked bay, surrounded by mountainous rocks over 3,000 feet in height; not a vestige of green to relieve the wearied eye.

The Persian Gulf and its vicinity is, however, rich in historic associations. Three hundred years before the birth of Christ, Nearchus, after conveying a portion of the army of Alexander the Great from the mouth of the Indus, disembarked at Bunder Abbas, near the entrance of the gulf. The main body of the army, conducted by Alexander, made its way westward behind the range of hills which skirts the coast of Beloochistan. It is said that from time to time Alexander indicated his position to Nearchus by means of polished steel mirrors and reflected sunlight. This is the first recorded instance of visual telegraphy, and it is a singular coincidence that the experiments which mainly led to the introduction of sun signaling in the British and other armies should have been made upon the very same ground more than 2,000 years afterwards.

In the Persian Gulf one occasionally witnesses natural phenomena, which, to the untraveled, may appear incredible. In the midst of these mountains near Mussendom I have witnessed, during a thunderstorm, such displays of lightning as baffle description. I have, at certain seasons of the year, observed the water in the bay, which was large enough to hold all the fleets of the world, presenting exactly the appearance of blood. At such times, after nightfall, the silvery, emerald green, phosphorescent effects produced by the moving boats were indescribably beautiful. Not many miles from Mussendom I have witnessed those mysterious fire circles flitting over the surface of the sea at a speed of 100 miles an hour—a phenomenon not often witnessed, and which no one has yet been able to explain. While steaming along the coast of Beloochistan I have been called from my cabin at night to witness the more common phenomenon of a milky sea, the water for miles around being singularly white and luminous.

In the same locality I have observed the sea to be for short periods as if putrid, the fish being destroyed in myriads, so that to prevent a pestilence measures had to be taken to bury those cast up on the beach. This phenomenon was doubtless due to the outbreak of a submarine volcano and the liberation of sulphureted hydrogen. In these waters jelly-fish are as large as footballs, and sea snakes of brilliant hue are met with in great numbers. On one occasion a swarm of sea snakes forced their way up one of the creeks in Karachi Harbor, apparently for the purpose of having a battle royal, for the ground between high and low-water-mark was thickly covered with their bodies, in positions which betokened a deadly struggle.

I have seen such a flight of locusts on the coast of Beloochistan that with every swish of a stick two or three locusts would be brought to the ground. The column extended for miles, yet it had all disappeared by the following day, most probably into the adjacent ocean, towards which they proceeded, under the influence of the northwest wind then prevailing.

From Jask, on the coast of Beloochistan, I have, in the hot season, observed the most perfect mirage effects. An exact image of a steamer then entering the bay has appeared inverted in the sky; and, still more wonderful, the image of a steamer has been observed over the mountains, inland, when the nearest vessel could not have been less than 120 miles away.

There are to-day more than 1,300 submarine cables in existence, the aggregate length of which can not be less than 162,000 nautical miles; they vary in length from a quarter of a mile to, say, 2,600 nautical miles, and may be roughly classified as follows:

Cables under 5 miles in length					761
Exceeding	5	"	and under	50	223
"	50	"	"	100	65
"	100	"	"	500	155
"	500	"	"	1,000	64
"	1,000	"	"	2,000	29
"	2,000				8
					1,305

Of these cables, about 18,000 knots belong to the various governments, while the balance, of 144,000 knots, mostly composed of long sections, have been laid by private companies. They represent a total expenditure of about 40,000,000 sterling, of which, probably, 75 per cent has been contributed by English capital.

Up to quite recently, nearly every telegraph cable of importance has been manufactured in this country; but England can no longer boast of a monopoly in this business. The development of French submarine telegraph enterprises is no doubt the direct outcome of the liberality with which the French Government has in recent years subsidized submarine communications. There are now established well equipped cable works at Calais, and a smaller establishment at St. Tropez, on the shores of the Mediterranean. In addition to these, there are the government works at La Seyne, near Toulon. The Italians have cable works at Spezzia. Germany has recently subsidized a direct cable from Emden to Vigo. Our telegraph supremacy may be considered by some as ranking next in importance to the supremacy of our navy. This natural rivalry is not without its significance, and shows that foreign governments are fully alive to the importance of fostering submarine telegraphy.

The sounding apparatus of Lord Kelvin has added immensely to the possibilities of ocean telegraphy. A sounding which in the old days would have taken two or three hours, and the value of which, even then, would have been doubtful, can now be ascertained in 20 minutes and be considered reliable. Notwithstanding the heavy weights employed, hemp lines could not be relied upon. In the Gulf Stream it was found almost impossible to get bottom with them. The use of ordinary pianoforte wire has proved a complete success. With a breaking strain of 270 pounds, it offers an extremely small resistance to the water, and gives accurate results in the strongest currents. Some 2,000 fathoms could be wound in in less than half an hour, even when the ship is steaming slowly ahead.

A knowledge of the contour and nature of the bottom of the ocean is of the utmost value to the cable engineer. He does his best to protect the sheathing of a cable from corrosion; but, so far as my experience goes, two inches of good substantial mud is the best preservative. I have on many occasions recovered cable which had evidently been resting in grey mud for nearly 20 years, and I have found it in as good condition as the day it left the factory. Deep-sea cables, when well away from shore, have this advantage: They generally rest on a fairly level and uniform bottom—an advantage not always enjoyed by shallow-water cables.

Professor Geikie, writing on the subject of ocean depths, remarks: "To be told that mud gathers on the floor of these abysses at an extremely slow rate, conveys but a vague notion of the tardiness of the process; but to be told that it gathers so slowly that the very star dust from outer space forms an appreciable part of it, brings home to us, as nothing else could do, the idea of undisturbed and excessively slow accumulation."

For all practical purposes the telegraph engineer may regard the oozy bottom of the sea in mid-ocean as in a state of eternal rest; the deeper the water the better the bottom, the safer the cable. In shallow water, however, the bottom, being subject to the action of current tides and waves, is frequently irregular, and we can not insure that the cable will rest fairly on the ground throughout its whole length. It is certain that there will be undulations and depressions, even though the bottom may be formed of hard mud; the cable rests on the ridges of these undulations, and is suspended in a series of long or short spans. In the course of years the cable becomes incrusted at intervals with shell fish and marine life. It sways gently with every turn of the tide. Marine monsters, such as sawfish, consider it their larder, and, while raking off the marine life, either rupture the cable or penetrate the core with one of their formidable teeth. In any case, sooner or later, the sheathing corrodes, and the cable parts altogether; or, as the outer wires give way one by one, the cable elongates, the core stretches until the copper conductor breaks, the ends being frequently kept insulated by the dielectric until the cable is lifted for repairs. Some of the faults that occur in submarine cables are of the most extraordinary character. Lightning, earthquakes, landslips, submarine volcanoes, have all to be reckoned with; and the leviathan of the deep has more than once been responsible for an interruption. This sounds incredible, but it is, nevertheless, true. But probably the most dangerous enemy is the teredo. To ward off the attacks of the latter, the plan is resorted to of covering the core with a thin taping of brass. Submarine cliffs, where the soundings rapidly vary from, say, 50 to 500 fathoms, should be especially avoided, as, if the cable is not taken well inside or outside of the line of soundings indicated on the chart, but rests near the edge of the cliff, long spans will be inevitable. The deep channels at the mouths of rivers have to be negotiated very carefully, or the cable is pretty sure to be fractured sooner or later by submarine landslips.

One of the most curious faults I have met with was that caused by the cable rolling down a submarine slope. In one direction, for a considerable distance, the iron guards straightened themselves out, while in the other direction the length of the lay had been reduced one-half, and the cable had twisted itself into the most fantastic shapes.

In order to effect the repairs which are necessary, a fleet of 41 telegraph ships is maintained; the gross tonnage of the telegraph marine being nearly 60,000 tons. The vessels are stationed in all parts of the world, and are fully equipped with the usual machinery for grappling, picking up and relaying. This machinery is substantially very similar in design to what it was 30 years ago.

The type of cable now generally adopted for deep water is a great improvement on that used in the earlier deep-sea cables. Five-and-twenty years ago the best wire used for cables had a breaking strain of, say, 50 tons per square inch. To-day wire is easily obtainable having a breaking strain of 90 tons per square inch. The application of a preservative tape and compound to each of the wires forming the sheathing—a plan, I believe, originally adopted at the Silvertown works—must tend to prevent or retard corrosion. As compared with a cable in which the iron guards rest one against the other, there is a saving in weight and in cost of materials, and, although the breaking strain may be slightly reduced, the cable will bear as great a length of itself in water as an apparently stronger type. The deep-sea portion of the latest Anglo-American cable and of the South American cable are of this type; and I consider the design an important improvement upon the old plan, where, to lessen the specific gravity, the sheathing wires were separated by intermediate yarns.

The cost of repairs is a most serious item in the accounts of a telegraph company; but there is a great element of luck in cable maintenance, and, fortunately, with deep-sea cables there is comparative freedom from interruption, though, when breaks do occur in great depths, the cost of re-establishing communication is likely to be very considerable. Repairing one of the Anglo-American cables is said to have cost, on one occasion, £95,000. This is probably the most expensive repair on record.*

The following brief notes regarding the amount of spare cable which may be necessary to effect repairs during the life of a cable laid in comparatively shallow water may be useful. You will, of course, understand that such a return can only be approximate, as much depends upon the type of cable and the care with which it was laid. My experience shows that, during the first five years of the life of a shallow-water cable, it is prudent to allow for one-half per cent per annum of its total length to provide for repairs.

In addition to this expenditure of fresh cable, we have also to consider the cost of the engineering staff and the maintenance of the repairing steamer, should an independent vessel be employed. Three per cent on the total length of the cable per annum, after 21 years, does not, at first sight, appear to be considerable for a shallow-water cable; but there comes a time when, in consequence of the great public inconvenience, loss of revenue and cost of repairs, it is cheaper either to make extensive renewals or to lay a new cable. Assuming the cable to be 1,000 miles in length, and that the foregoing estimate is approximately correct,

* This is, of course, an exceptional case. I have just received a direct United States cable report, from which it appears that, during the past 20 years, the cost of repairs, including ship and cable, has averaged about £8,000 per annum.

From the	6th	to 10th	year, say	¾ per cent.
	11th	to 16th	"	1 "
	17th	year		1¼ "
	18th	"		1½ "
	19th	"		1¾ "
	20th	"		2 "
	21st	"		3 "

then 30 miles of cable would be expended annually. This would probably mean 10 or 12 interruptions. As a matter of fact, 16 interruptions was the actual number that occurred in the Persian Gulf cable of 1,740 knots during the twenty-first year. The inconvenience of such frequent repairs was felt to be so great that the alternative of picking up, stripping and re-sheathing nearly the whole of the weaker sections at the government cable factory at Karachi was resorted to with most advantageous results.

Many years ago (in the seventies) I had the privilege of being allowed to inspect the working on the Atlantic cables at Valentia. For several days I watched the signaling conducted by operators, who were splendid "mirror" readers. The siphon recorder had not then come into general use. A rate of over 20 words, or 100 letters, was obtainable during a trial; but I noticed the speed obtained with ease in practice, when messages containing a fair proportion of foreign and code words were being transmitted, was 15 and 16 five-letter words per minute. At this rate, 50 or 60 ten-word tariffs were transmitted within the hour. This included preambles, collations and repetitions, the latter being extremely rare. By abbreviating the preamble and collations in accordance with modern practice, much greater commercial efficiency is obtained, and the proportion of words paid for becomes greater. As an instance of how the commercial efficiency can be worked up under pressure, I may mention that, during an occasion when the whole of the traffic to and from the East was thrown on the Persian Gulf line, the number of telegrams passed through the cable during the 24 hours was rapidly increased from about 650 to nearly 1,000 daily.

Great Britain supplies the majority and the best of our telegraphists for long submarine cables. In reading the mirror, recorder and manipulative skill, they far surpass the operators of any other nation. In working land-line Morse circuits by "sounder", the Americans are the only people who can compare in rapidity with our countrymen. It is to be regretted we do not see more of our telegraph friends at the meetings of this institution. Telegraph administrations should, I think, encourage their employés, especially those that are to serve at foreign stations, to take every opportunity to render themselves thoroughly proficient, not only in a knowledge of the apparatus in daily use, but also in a knowledge of testing. A clerk is none the worse operator because he happens to be an intelligent electrician. The life at isolated cable stations must often be a dull one, and if the employé can be encouraged to devote his spare time to improving his mind by the study of a most fascinating and interesting subject, the result, I am convinced, would be beneficial in many ways, not only to the man, but to the company he serves.

In connection with testing, I may be permitted to give a word of advice to young beginners. Use few formulas —the fewer and simpler the better— but apply them with judgment. Test as soon as you can after the occurrence of a fault, see that your plugs and contacts are clean, and, if you are in a cable ship, keep your head cool. The average distance between the assumed and actual position of faults in the Persian Gulf cable, where the sections vary from 150 to 500 miles in length, is, I find from a recent report for that department, less than one-third of a knot, so that the electrician can localize the breaks closer than the captain can navigate his vessel.

[To be concluded.]

American Bell Wins a Suit from Western Union.

The decision in the Western Union–Bell Telephone suit, rendered by the United States Supreme Court on April 12, involved a claim made by the Western Union under its contract with the American Bell Telephone Company, which expired last November. The Western Union, through the American Speaking Telephone Company, had been engaged in the telephone business in 1879. The two companies made their contract, by which the Western Union confined itself to the telegraph field, and the Bell company restricted itself to the telephone business. Under this contract the Western Union, through the American Speaking Telephone Company, received 20 per cent of telephone rentals of local concerns. About 1884 a claim was made that this agreement gave to the Western Union 20 per cent of the franchise stock of various local companies. It is this claim that, after various phases of litigation, has been decided in favor of the Bell Telephone Company. G. H. Fearons, attorney for the Western Union, says, with reference to the Supreme Court decision, that this is the old suit, brought about 12 years ago against the American Bell Telephone Company, under the contract of July 10, 1879, for a percentage of the royalties received by the Bell company from its lesser companies for the privilege of doing a telephone business. The case was decided against the plaintiffs, of whom there were several, including the Western Union. The Western Union moved to dismiss the action, but the court refused to do so, and the plaintiffs carried the case to the United States Supreme Court.

Dynamo and Engine Wanted.

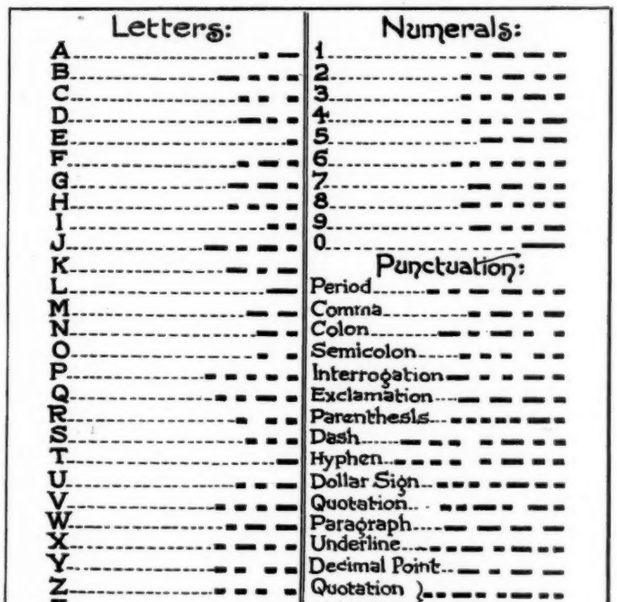
The Clarion, Pa., Electric Company contemplates putting in an additional alternating-current dynamo and engine.

Preserving the Life of X-Ray Tubes.

At the Academy of Sciences, New York city, Mr. Max Osterberg, recently exhibited the phenomenon lately discovered by him, showing that, after a tube has been too highly exhausted to admit of X-ray discharges, a ring of tinfoil placed at the terminals of the tube will bring back the fluorescence. At the exhibition one tube was treated in this way for three hours, the tinfoil rings being constantly put on and taken off, thus clearly demonstrating the phenomenon. Mr. Osterberg also exhibited his complete X-ray outfit, which has many valuable advantages over the early styles of apparatus.

A Large Telegraph System.

Superintendent Charles Selden, of the B. & O. telegraph, said the other day that the average number of messages handled every day on the B. & O. system was 53,000, exclusive of train orders. The B. & O. has 22,252 miles of telegraph wire, of which they use 7,240 for company's business and the balance is leased to the Western Union. There are 384 telegraph offices on the line, of which 234 are reporting Western Union offices. Mr. Selden employs in his department 750 men, exclusive of linemen. He also has charge of the block signal offices which, east of the Ohio River, average one to every six miles. The service of the company's plant is considerably augmented by the use of several multiplex systems.



THE MORSE TELEGRAPH CODE.

LITERARY.

Electrical Doings, a monthly journal recently established in New York city, has suspended publication.

Our esteemed contemporary, the *Electrical Engineer*, has removed its offices from 203 Broadway to the new Beard Building, 120 Liberty street, New York city, where quarters better adapted to the needs of the paper have been secured.

THE MORSE TELEGRAPH CODE.

INTERESTING COMMUNICATION FROM SUPERINTENDENT W. C. HUMSTONE, OF THE WESTERN UNION TELEGRAPH COMPANY.

TO THE EDITOR OF ELECTRICAL REVIEW:

As requested, I send you a copy of the Morse code in use at the present time. The only changes within my recollection are the adoption of more convenient signals for some of the punctuation marks, such as "QN" for quotation marks, instead of the double comma formerly used, etc.

There has been, in the past, so much written and printed pro and con upon the merits and demerits of the Morse alphabet, and the subject has been so thoroughly discussed from every possible standpoint, that it would be quite useless for me to attempt anything new in that direction. The chief, and, as far as I can learn, the only, objection to the Morse code has been the alleged liability to error where the so-called "space" letters "C, O, R, Y, Z" occur in juxtaposition. I do not hold with the critics on this point, as my personal experience has been that a very small proportion of errors are due to this cause; no more, in fact, than might arise from combinations of other letters, such as "F" for "AE", "W" for "AT", etc. No great importance seems to have been attached to this particular point until early in the 70's. In 1873 the *Journal of the Telegraph*, at that time the leading electrical periodical in the United States, took up the subject, and a suggestion was made to adopt the European, or Continental, code, as a means of overcoming the objections referred to. This gave rise to considerable argument on the question, a great deal of which was published under the head of "Correspondence" in the columns of that paper. No official action resulted, and the matter gradually dropped out of sight, and, so far as I am aware, there has been very little controversy since that time, except in a desultory way.

The code, as it now stands, appears to meet the requirements of business, and to have stood the test of time. I do not apprehend any change, unless such change may be found necessary, in order to adapt it to some automatic apparatus that may be brought out in the future, as has already been done in case of letter "L" and figure "0" in connection with the Wheatstone system, as operated by the Western Union Telegraph Company.

W. C. HUMSTONE, Superintendent.
New York, April 10.

New York Electrical Society.

At the last meeting of the New York Electrical Society, held on April 7, the following new members were elected: H. B. Coho, 203 Broadway; Willard E. Case, Hotel Waldorf; Frank Sutton, Bowling Green Building; Deronda Levy, Ward Electric Construction Company, 29 Ann street; A. Hamerschlag, Cathoscope Electric Company, 26 Liberty street.

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Special Notice to Advertisers.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication on the following week.

NEW YORK, APRIL 21, 1897.

CONTENTS.

	PAGE
Views, News and Interviews	181
American Institute of Electrical Engines	181
The New Heilmann Electric Locomotive	181
Forest City Electric Company Visited by Fire	182
Extensive Conduit Work at St. Louis	182
Telephone Conversations as Evidence	182
Railway Contracts Awarded	182
Electric Light Flashes	182
American Motor Starting Rheostat	183
Novel Wire Stretching Device	183
Death of J. J. Storrow	183
The "Glad Hand"	183
An Electric Hatter's Iron	183
Selective Signal Telephone System	183
Telephone News and Comment	183
Submarine Telegraphy	184
American Bell Wins a Suit from Western Union	185
Dynamo and Engine Wanted	185
Preserving the Life of X-Ray Tubes	185
A Large Telegraph System	185
Literary	185
The Morse Telegraph Code	185
New York Electrical Society	185
Three-Cent Car Fares	186
The Industrial Revival	186
Personal	187
Late News	187
Death of W. A. Hungerford	187
Street Railway Consolidation in Baltimore	187
Newark, N. J., Telephone Company	187
Scott Medal for Electric Carriages	187
Financial Practice and Engineering Methods of American Street Railways	188
Brooklyn Bridge Traction	189
Electric Railway Notes	189
American Transatlantic Telegraphy	190
Western News Notes	190
Louisville, Ky., Street Railway News	190
J. G. White & Company, Incorporated	191
The Cazin Steam and Water Wheel	191
Advance Information	192
The Electric Burglar	192
Kindred Interests	ix
Electrical Patents	x
The Weiss Drill Case	x

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
Abendroth & Root Mfg. Co., boilers	xvi
American Electrical Works, insulated wire	i
American Engine Co	xvi
Babcock & Wilcox Co	xvi
Bunnell & Co., J. H., dry batteries	i
Campbell & Zell Co	i
Clonbrock Steam Boiler Co	xvi
Crefeld Electrical Works	i
Crocker-Wheeler Electric Co	i
Day's Kerite, insulated wire	i, viii
Electric Appliance Co., supplies	i
Electric Storage Battery Co	xv
Hampson, E. P., & Co., engines	xvi
Imperial Porcelain Works	xvi
Interior Conduit and Insulation Co., Lundell dynamos and motors	i
Iron Clad Rheostat Co	i
McKenney & Waterbury	i
New York Insulated Wire Co., Grimshaw wires and cables	i
New York & Ohio Co	i
Okonite Co., insulated wire	i, xvi
Partridge Carbon Co., motor and generator brushes	i
Safety Insulated Wire and Cable Co	i
Standard Paint Co., insulating compound	i
Stirling Co., water-tube boilers	xvi
Thayer & Co	i
Van Nuis, C. S	i

INSIDE PAGES.

	PAGE
American Bell Telephone Co	xiii
American Electric Heating Corporation, electric stoves and car heaters	vi
American Electric Telephone Co., long-distance telephones	xiii
American Impulse-Wheel Co	x
Automatic Circuit Breaker Co	xiv
Baker & Co., platinum	xiv
Beacon Lamp Co., incandescent lamps	ix
Belknap Motor Co	xii
Berlin Iron Bridge Co	vii
Biddle, J. G	xi
"Big Four" R. R	x
Bliss Co., E. W., presses, dies, shears, etc	iv
Brady, T. H., Brady mast-arms	xi
Brill, J. G, Co	xiv
Brixey, W. R., Day's kerite wires and cables	viii
Brush Electric Co	vi
Bubier Publishing Co	xii
Buckeye Electric Co	iii
Bullock Electric Mfg. Co	xiv
C. & C. Electric Co	xiii
Carborundum Co	vi
Central Electric Co., electrical supplies	iii
Chicago, Milwaukee & St. Paul Railway	ix
Coles, Walter S	x
Connecticut Pipe Mfg. Co	xiv
Diehl Manufacturing Co	iii
Dixie Company	x
Dixon, Jos., Crucible Co., belt dressing	vi
Duval, E. S., Jr., patents	x
Dyer & Driscoll, patent solicitors	x
Eastern Electric Cable Co	x
Eastman Kodak Co	x
Edison Mfg. Co	xi
Electric Launch Co	vii
Electrical Mercantile Agency	ix
Elwell-Parker Electric Co. of America	xii
Empire China Works, porcelain specialties	vi
Eppenger & Russell Co., Valentine subway electrical conduit	xiv
Equitable Life Assurance Society of the U. S	xiv
Faraday Carbon Co., carbons	viii
Forest City Electric Co	viii
Fort Wayne Electric Corporation	vii
Gordon-Burnham Battery Co	x
Green & Bauer	xi
Hemingray Glass Co	ix
Huebel & Manger	ix
Hunter Fan and Motor Co	vii
India Rubber and Gutta Percha Insulating Co	iii
Interior Conduit & Insulation Co	vii
International Correspondence Schools	ix
Jewell Belting Co	iv
Keystone Electrical Instrument Co	viii
Knott, L. E., Apparatus Co	x
Lehigh Valley Creosoting Co., creosoted lumber	xii
McCaskey & Holcomb Co	ix
McIntire, C., Co	ix
Manhattan Electrical Supply Co	xiii
Marshall, Wm., condensers	xiii
Metropolitan Electric Co	iv
National Conduit & Cable Co	v
New England Engineering Co	vi
New York Telephone Co	xii
Novelty Electric Co., supplies	vi
Orient Electrical Co	ix
Ostrander, W. R., & Co., supplies	x
Partrick & Carter Co., electrical supplies for housework	ix
Phillips Insulated Wire Co., wire	viii
Reisinger, Hugo	viii
Ridlon Co., Frank	ix
Royce & Marean, electrical supplies	xii
Schiff, Jordon & Co., carbons	viii
Sessions Foundry Co	xii
Solar Carbon and Manufacturing Co	vi
Spring Park Laboratory	xi
Standard Thermometer & Electric Co	iv
Stanley Electric Mfg. Co., S. K. C	xi
Sterling Supply & Mfg. Co	xiv
Utica Electrical Mfg. & Supply Co	vii
Viaduct Mfg. Co., telephones, etc	xiii
Wanted	x
Wedderburn & Co., John, patents	x
Western Electric Co	xii
Western Telephone Construction Co	xiii
Westinghouse Electric & Mfg. Co	iv
Weston Electrical Instrument Co., measuring instruments	viii
White & Co., J. G., engineers and contractors	v
White-Crosby Co., contracting engineers	ix
Whitney Electrical Instrument Co	ix

Mr. J. J. Storrow, the eminent Boston patent attorney, dropped dead of vertigo while in the Congressional Library at Washington, April 15. Mr. Storrow was the attorney of the Bell telephone interests almost from the day the patent was issued, and, we believe, never lost a case on final hearing. His sudden death was a great shock to his many friends.

THREE-CENT CAR FARES.

There was a great time in Indianapolis last week over three-cent car fares. At the recent session of the Indiana Legislature a law was passed reducing street car fares in Indianapolis from five to three cents, and the act went into effect on April 15. It provides for the recovery of civil damages not to exceed $100 for a refusal to accept the fare, and all employés collecting in excess of three cents for a single ride are subject to fine. On the day the law went into effect the patrons of the company began to offer the legal fare, but the conductors refused to accept it and demanded five cents. In all cases where this was not paid the passengers were ejected from the cars, the conductors calling road officers of the company to their aid when resistance was made. In many cases ladies refused to pay the fare and were put out.

On the next day companies of 10 or 20 citizens stood at the street corners and boarded the cars for the express purpose of forcing the company to accept the legal fare. When the conductor, on asking for a five-cent fare, tried to eject any one, he found ten or a dozen determined men ready to assist the passenger. Before noon the conductors found that the people were organized against them, and many accepted the legal fare.

Popular feeling ran so high that the Mayor of the city called upon President Mason of the railway company, and it was agreed that three cents should be accepted as the fare till the test case pending in the courts is decided. Suit is now pending in the Federal court, in which ex-President Harrison appears for the company, asking for an injunction against the enforcement of the three-cent law. The Grand Jury has returned indictments against President Mason and Superintendent Elliott for violating the law.

If the reports telegraphed about the matter are correct, the railway company seems to have done a foolhardy thing in attempting to ignore the law. It would have been better, apparently, to observe the law and secure redress legally.

In this issue we give a description of the new Heilmann electric locomotive, popularly known as "the central station on wheels". The efficiency of the locomotive is stated to be 48.4 per cent, which makes a bad comparison with the B. & O. locomotives in the Belt Line tunnel. The average street railway motor is good for 80 per cent, and under favorable conditions 90 per cent efficiency.

THE INDUSTRIAL REVIVAL.

In all parts of the United States are to be noted the voices of the couriers of the coming of the wave of prosperity. These voices are not so loud, nor so strong and numerous as they will be, but yet they are potent and significant.

We copy from the conservative and accurate New York *Tribune*, of April 18, the following editorial relating to this important question:

Amid the loftier spiritual significances of the Easter time, in this month of opening, it may be pardonable to call attention to some more material features. The renewal of life affects not only the soul and the wide realm of nature; it comes this year, as well, to the affairs of men. Industries are reviving. Business is expanding. The tide of popular prosperity is rising. Of this there can be no doubt. Unmistakable testimony to it comes from every hand in the news of every day; often with half-glad reluctance from those who professed not to expect it nor to believe in it. There is to-day no more reason to doubt it than to doubt the budding of the trees or the upspringing of the grass.

Of this auspicious circumstance, the *Tribune* may claim without undue presumption to be a faithful index. For weeks its advertising columns have increasingly set forth the confidence and the prosperity of the best business houses in all lines of industry. To-day their exposition is far more extensive and impressive than before; yet there is reason for expectation, that the climax thus reached will be effectively capped again and again. For this is no ephemeral display, no mere sensation of a season. The advertising patrons of the *Tribune* are the steadily progressive, all-the-year-round business houses, and the public which they seek, and which they well know is best to be found through these columns, is a like substantial factor in social economy.

The splendid showing made in our advertising pages is, therefore, significant of real prosperity; of—if the phrase may not be irreverently employed—a genuine industrial and commercial resurrection. In this the *Tribune* feels that it has individual reason to exult, since it is a triumph of those economical principles of which, since its first issue, it has been a persistent and consistent advocate, and it cordially congratulates its myriads of friends upon a result so greatly beneficent to them and to the common fatherland.

Secretary Long begins his administration of the Navy Department with an "economy order". Hereafter, on all of our government vessels, the dynamos used for lighting must be closed down from 11 o'clock P. M. until the rising hour in the morning, about 5 o'clock. Meanwhile oil lamps and tallow dips must be used to light the ship, except in cases of emergency. The Secretary seems to understand that the nub of nearly any electrical matter lies in the coal pile.

A feature of the Easter Sunday parade on Fifth avenue, in New York city, was an electric carriage which, for the time, attracted more attention than the millinery creations.

PERSONAL.

General Manager Lavans, of the General Incandescent Arc Light Company, New York city, sailed for Europe last week.

Col. C. F. Sise, president of the Bell Telephone, of Canada, came down from Montreal to the metropolis on Thursday last for a week's visit.

Mr. Stevens, of the Keystone Electrical Instrument Company, Philadelphia, was among the out-of-town visitors to New York city last week.

Mr. David S. Greenough, of Boston, has been elected a director in the Erie Telegraph and Telephone Company to succeed Hon. Francis Jewett, deceased.

Mr. A. Prinxhorn, manager of the Continental Caoutchoue and Gutta-Percha Company, of Hanover, Germany, is visiting in the United States and is now in New York city.

Mr. Brendish, the survivor of the two telegraphers who sent the historic message from Delhi announcing the outbreak of the Indian mutiny, has just retired from the Indian telegraph service.

Mr. George T. Manson returned to the city of New York last week, after a trip of several weeks in the South and West. Mr. Manson arrived home from his very successful tour for the Okonite product with vocal cords somewhat impaired, but otherwise in fine health.

The following-named out-of-town visitors registered at the headquarters of the National Electric Light Association, 136 Liberty street, for the week ended April 16: A. J. Simmons, Boston, Mass.; E. O. Wagmore, Dayton, Ohio; N. J. Mitchell, Philadelphia, Pa.; F. M. Law, Philadelphia, Pa.

Mr. John H. Holmes, M. I. E. E., of J. H. Holmes & Company, well known electrical manufacturers and engineers, of England, is visiting this country. Mr. Holmes has spent a few days in several of our leading cities, and will visit many of the electrical manufacturing and light and power companies before his return.

Mr. M. E. Baird, of the Eddy Electric Manufacturing Company, Windsor, Ct., has returned from an extended western trip. Mr. Baird reports that the business conditions in the far West are rapidly improving, especially in the electrical field. He also states that there is a strong demand for Eddy apparatus, particularly on the Pacific coast.

Mr. Walter P. Phillips, of New York city, manager of the late United Press, has sent to his many friends, under date of the Lotos Club, a circular letter thanking them for their many expressions of good will toward him. Mr. Phillips speaks in highly commendatory terms of the loyalty and faithfulness of his many associates in the conduct of the United Press.

The Edison Electric Illuminating Company of Boston, Mass., has declared a quarterly dividend of one and three-quarters per cent, payable May 1. Books closed April 17; reopen May 2.

LATE NEWS.

The authorities have finally decided that the charge per round trip for passenger trains over the Brooklyn Bridge shall be 12½ cents for elevated cars and five cents for trolley cars, the latter to furnish their own motive power.

A cable dispatch says that work has begun on the Jungfrau Railroad, which will run from Scheidegg, a distance of eight miles, to the summit. The Jungfrau is 13,000 feet above sea level. The journey will occupy 100 minutes, and the round trip fare will be $8. The cost is estimated at a little less than $2,000,000.

The Illinois Senate has passed both of the Humphrey bills by a vote of 29 to 16. These bills increase the life of Chicago street railway franchises to 40 years and create a State commission to fix rates for franchises. An amendment which was passed makes the General Electric Railway Company amenable to the new law.

Helen Brown recently recovered a verdict in the County Court, in Brooklyn, N. Y., against the Nassau Electric Railroad Company, for $2,000 for personal injuries. Judge Hurd, of the County Court, has granted an order to show cause why it should not be set aside, on the ground that newly discovered evidence showed that the case was fraudulent from the beginning. The company asserts that the accident never occurred. The doctor for the company also states that the injuries were fictitious.

Street Railway Consolidation in Baltimore.

Negotiations for the consolidation of the Baltimore, Md., street railways into one system are still in progress, although it is understood that a satisfactory basis has been reached and details are now being worked out. It is stated that the terms of the consolidation are agreeable to Baltimore Traction and the City & Suburban Railway Company, and that the City & Suburban stock shall be rated at $4,750,000, so as to equalize it with the $5,750,000 of Baltimore Traction stock. President House, of Baltimore Traction, it is stated, will be general manager of the consolidation.

Death of W. A. Hungerford.

William A. Hungerford, who for several years had been connected with Benedict & Burnham, died on April 15 at his residence in New York city, aged 47 years. Mrs. Hungerford, two sons and a daughter survive him. He was a member of the Colonial, Union League and Hardware clubs, and of the New England Society. The cause of his death was inflammation of the stomach.

Newark, N. J., Telephone Company.

A rule to show cause why a receiver should not be appointed for the Newark, N. J., Telephone Company has been granted by Vice-Chancellor Pitney in Jersey City. The application was made by counsel for Frank H. Hall, of Jersey City, who says he owns 77 shares of the company's stock. He charges that the company is insolvent, and that its business is being conducted at a loss.

Scott Medal for Electric Carriages.

The following is an abstract of the report of the Committee on Science and the Arts of the Franklin Institute, Philadelphia, under which the John Scott Legacy Medal and Premium were awarded to Messrs. Morris & Salom, representing the Electric Carriage and Wagon Company, for the electric carriage developed by them. A number of carriages built by this company are now in successful operation in New York city:

Your committee has examined and tested the "Morris & Salom Automobile Vehicle" actuated by electricity, that has been submitted to the Committee on Science and the Arts of the Franklin Institute.

The style of the vehicle is a surrey, with several marked changes in the design from the familiar style of surrey for horse power. It is advisable to consider the invention on its own merits, not in comparison with other horseless vehicles, as there has been no opportunity to test its action in comparison with vehicles actuated by steam or other engines. It is to be noted that designers of the machine have not felt hampered by preconceived requisites, or peculiarity of form pertaining to vehicles in common use, their principle of construction favoring the use of electricity on all kinds of vehicles.

In adapting the direct-current electric motor and storage battery to vehicles, they have modified the running gear, mainly of the carriage, to such motive power, instead of adapting the motor and the storage battery to the carriage. The most noticeable departure from common practice is placing the driving wheels in front, with movable steering or guiding wheels at the rear.

By placing the steering wheels behind the driving or pulling wheels, steering wheels of small diameter, if required, will act to better advantage under traction than if placed in advance of the driving wheels, to be pushed by the propelling power. A familiar illustration of this can be found in the small wheel of a wheelbarrow, which can be pulled with ease over an obstruction that can not be surmounted by pushing. In this automobile vehicle, the driving wheels perform the function of the horse in an ordinary vehicle and do the pulling, hence the advisability of limiting the pushing action on the steering wheels, regardless of their size, to the less called-for function of backing the vehicle. This feature is considered especially noteworthy.

The carriage examined by your subcommittee and tried on the streets of Philadelphia, is designed to carry four passengers including the driver. It is said to weigh 1,850 pounds, complete, with batteries. The machinery is hidden from sight, except the steering lever, which is to the right of the driver, whose location is on the left-hand side of the front seat, the controlling box and lever being in front of and close to the driver's seat, and level, therewith, between his knees.

The storage batteries employed in this instance were furnished by the Electric Storage Battery Company, of Philadelphia, a company organized to supply stored electric power for such purposes. The battery consists of four sets of 12 cells each, having a normal capacity of 60 ampere hours per cell. The cells are grouped in boxes, arranged to be readily pushed under the seat from the rear, making automatic connection with the controller. To remove and replace the set of cells need not consume more than two minutes. The cells can be handled by two men with ease. The carriage has a maximum speed of 20 miles an hour on a good road or pavement, and can be counted on for a run of from 25 to 35 miles with one charge of the battery cells.

One of the new features developed since the electric carriage under consideration was built, is what the inventors call their "Tracteur" idea.

By this method of design and construction all the dominant features of carriage construction, so far as related to the various kinds of pleasure vehicles in common use and known by specific names, such as coupes, cabriolets, victorias, barouches, carriages, brakes, etc., are maintained.

In the "Tracteur" design everything connected with the motive power of the vehicle is located on and pertains to the front truck or wheels. These wheels are the driving wheels just the same as in the carriage under consideration, the motors and driving gear being fastened to the front axle. But instead of placing the battery box in the body of the vehicle and supporting the same on the front and rear wheels, the battery box is in front, and immediately above the front axle, and the driver's seat is on top of the battery box. This box does not take up any more room than the ordinary fifth wheel and springs in carriages designed to be pulled by horses, and the rear of the carriage can, therefore, be precisely similar in size and construction to those now in ordinary use, the only difference being that in this case they steer by the rear wheels, which, of course, have nothing to do with the carriage body proper; the steering apparatus being controlled from the front or driver's seat by a lever on the same, actuating the rear wheels in parallel planes as has been already described.

Your committee believes that the style of the carriage and mode of operation are well adapted for its scope of utility, namely, in the case of passenger coaches of all kinds or parcel vans, limited to locations where the means of recharging the storage battery are to be found, and wherever electric stations are available. They may find users in suburban residences already equipped with local or private lighting plants.

Its points of merit are:

1. Safety, as compared to such carriages operated by steam or other engines.

2. Freedom from vibration incident to the motive power.

3. Freedom from heat and odor.

4. It is simple in construction and suitable to all forms or styles of vehicles.

5. It can be handled with ease and is at all times under perfect control, requiring little skill to keep its motive power in order, as compared to attention needed to operate steam, hot air, or oil engines on road carriages.

6. The power from storage battery is economical in use and can not be made wasteful in operation, as the electric current from the battery flows only while the machine is in motion, and, while ready, when charged for immediate use, the power stored is not lost or liable to deterioration when the machine is at rest, nor is there danger to life or property incident to its propelling power when in use.

In consideration of the novelty in design, and correctness of principle involved in the manner of adapting electric motors and storage batteries to road vehicles, the Franklin Institute considers the invention worthy of high commendation, and recommends the award of the John Scott Legacy Premium and Medal to the inventors, Pedro G. Salom and Henry G. Morris.

FINANCIAL PRACTICE AND ENGINEERING METHODS OF AMERICAN STREET RAILWAYS.

DELIVERED BEFORE THE NEW YORK ELECTRICAL SOCIETY, AT COLUMBIA COLLEGE, APRIL 7, 1897, BY E. E. HIGGINS.

(*Continued from page 170.*)

Now, American street railroads are in possession of their territory by virtue of franchises and charters of varying value; the great majority of them of much less value than corresponding charters and franchises under which steam railroads operate. In a large number of the States of the country, in fact, I think in nearly all, the charters granted under general railroad laws, or under special railroad laws, expressly reserve to the State the right to modify or amend, practically without limit. As far as I know that right has never been exercised to any serious extent. Lately there has been a slight movement in the direction of appealing to the State authorities to modify or amend the charters, in order to accomplish what the municipalities can not accomplish by the franchise which they have granted; but that is not at all general, and probably will not be resorted to to any serious extent. The municipal franchises granted to street railways within the last few years are of much less value, with few exceptions, than the earlier ones. The early franchises of New York, Pennsylvania, and one or two other States, are practically for perpetual operation, 999 years, or 499 years, and are usually very good. In Illinois franchises are much less valuable, chiefly because they have an extremely short time limit—15 years time limit by State law—although in a few cases, where the franchises were granted before that law was passed, they are for longer periods. Thirty and 50-year franchises are being granted nowadays far more frequently than used to be the case, and this is having a very serious effect upon the prosperity of street railroads; and, in fact, where the time limit is very short, the people can not expect, and will not receive, the service which will be given by a road whose franchises are for long periods, for the simple business reason that companies can not afford to take chances. In Massachusetts the condition of affairs is even worse; that State being almost unique in some respects, in that the street railway companies are practically tenants at will of the city and State; and while there is no definite limit placed upon their charter and franchise rights, the practical limit being the willingness of the companies to comply with the demands of the city and State, a sword constantly hanging over the companies, which can be used with great force by the authorities, is that if you do not do such and such things we will do such and such things, and they can. As a matter of fact, however, the actual danger in Massachusetts is not great, for the people there have a good common-sense way of looking at things, particularly at the rights of property and investment, and I do not think there is much danger to be apprehended by the street railway companies. The police regulations, which govern in almost all American cities, have been expanded by practice in later years to cover almost every kind of burden. The franchises for the operation of roads by electricity have been used to impose additional burdens of a very serious nature.

It is thought by the newspapers of the country, or at least it is so expressed by them, that the street railways of this country are not paying to the municipalities anything like what the franchises are worth, and all sorts of comparisons are made between what is being done across the water in that line, and all sorts of possible contracts with the city are brought up; but many things are lost sight of. It is impossible to generalize on this question of franchises any more than it is on a thousand other street railway matters. There is, perhaps, no branch of industrial life where generalizing is so unsafe as in street railroading. At the same time this thing is particularly true, that whatever may have been the original conditions under which street railways were granted the rights to operate roads, the conditions to-day are such that they have exceedingly heavy burdens; as heavy, I believe, all things considered, as are found in any of the cities of Europe. These burdens come in a number of ways. In the first place, the introduction of electricity made it necessary to tear up the streets. The cities promptly utilized the power which they had to impose burdens, by obtaining from many of the companies a contract to pave and keep in repair a large portion of the streets through which their lines run. One conspicuous example of this is a certain company, which operates several hundred miles of track, which is obliged to pave and keep in repair perpetually every mile of street, from curb to curb, through which its cars run, and the condition is the more burdensome from the fact that in that particular city the mileage is almost entirely of single tracks. Again, the taxes on gross receipts are now a common feature of municipal finance. This tax runs anywhere from three per cent to 10, 15 or 20 per cent; in one case 6,000 per cent. but I believe that road is not operated. [Laughter.] Other burdens are the usual ones of taxes on real estate and personal property, which are always imposed, I think, without exception, and car licenses, and taxes on pretty nearly everything where a tax can be by any means imposed, are not uncommon features of street railroading as it is found to-day.

In addition to all this there comes the fact that where a franchise is granted for but 20, 30, 40 or even 50 years, without any statement in the contract as to what is to occur at the end of the franchise period, the question resolves itself into one of a tax on franchise, because something has got to come out of earnings and be put aside to take care of any possible changes at the end of that time. For example, a street railroad company has no knowledge as to what will happen at the end of 20 years; it may be obliged to sell its equipment, buildings, tracks, etc., for old stock. It is at the mercy of any company which comes in at the end of that time and bids for the franchise. Now these things are pretty serious, and, taken all in all, you will find that the gross tax paid by street railway companies of the United States to the State and municipal authorities—the municipal authorities, as a rule—is a very considerable proportion of their entire receipts.

The question of traffic—the theory of the American system of operating street cars—is based on a uniform fare. I do not suppose the reasons for that were ever argued pro and con and established on a theoretical basis; at the same time, the test of the theory lies in the fact that no attempt has ever been seriously made to change over from the uniform fare rate to the differential rates common in Europe. Now, the operation of this uniform fare rate in our street railroad system is this—conversely, a differential rate placed on traffic, as it is found here, would mean here, as it has meant in Europe, that the cities would be condensed in area. As soon as you say to a man that, if he goes out three miles away from the heart of the city, he must pay six cents, and if he lives within two miles he must pay but four cents, he begins to figure up at once what the four cents a day excess, for the round trip each day, amounts to in a year, and in the case of the workers, whose patronage is the backbone of American street railroads, it means a great deal, and in many cases that he will go to tenement-house living. European cities are extremely congested, very small in area, very great density of population. American areas, on the contrary, are large, have always been larger than in Europe, but during the last six or eight years they have expanded in a way which you all know, and to an extent which is marvelous. I am looking forward with a good deal of interest to see the results of this outgoing force as it will be shown by the next census. I believe the results will be such as to fill us all with a profound sense of gratitude to the street railway companies, and to electricity as a motive power; for it is only by means of a cheap, flexible, rapid, easily controlled motive power that such a result could possibly be accomplished. Short-distance riding is the profitable on a street railroad. Long-distance riding is in many of the cities distinctly unprofitable traffic. If the entire passenger traffic of any large city were doubled as to the distance traveled, it would probably mean bankruptcy; or, to put it another way, if all the passengers on the street railroad system of a city were to travel on an average 75 per cent of the longest distance which they could travel according to the track mileage, instead of perhaps 40 or 50 per cent—no one knows exactly what the percentage is—it would probably mean very serious financial difficulties. Of course, the operation of the uniform fare means that short-distance riders have to pay a part of the fare of the long-distance riders. From a socialistic point of view, that is, perhaps, a proper burden; in other words, the many will gain at the expense of the few, and the few who chose to ride the short distances may be presumed to be financially able to do so. It may be said that those who live in the outskirts will not be the many, but the few; however, the many gain in the increase of city areas, assessed valuation, reduction of taxes, and the general improvement in the conditions of living. I think that will be readily granted. The difference between European and American practice is something astonishing. I have not with me figures to show it, but if you will compare cities of the same population in Europe and America—in England and America, we will say—you will find that the street railway mileage in English cities is from one-third to one-half the street railway mileage in American cities, and the traffic—that is, the use which the public make of the street railway service—is anywhere from two to five or six times greater in America than in England.

Now, at the end of the horse railroad period, and at the time when electricity was being introduced, came up exaggerated notions of profits to be derived from electric railroad operation, and exaggerated ideas of what could be done in extending into the suburbs, and the consequence is that, coincident with the increase of speed and increase of traffic due to the adoption of better motive power, there is an increase in mileage. Competition came in. The old companies, which had been operating carefully and conservatively their horse railway properties, found it necessary either to suffer from the effects of competition on parallel lines built by syndicates which were anxious to put in electric railways wherever they could find streets to put them in, or else build the mileage themselves. It is easy to see that the people of a city will, as a rule, be anxious for more facilities, and they will naturally further any efforts made by outside people to come in and build more street railways. The common councils are naturally anxious to have the same things done, and, knowing that the people were behind them, it was quite easy to obtain franchises by the old or new companies. The consequence was the great overbuilding of street railway lines in many of the cities; not only of building for the future, which is legitimate for a long-time investment; not only running into the suburbs and generally into places where traffic can be created in time, but the actual paralleling of existing roads where the service was not necessary on a broad view of the traffic conditions in different cities, and consequently the necessity of keeping up the mileage and operating cars over it, and all the consequent evils of over-building. That fact is particularly noticeable, I think, in the West, partly that, and partly because roads were put into the only cities that they had there—the small cities—we find this significant feature in the statistics which I read a few moments ago. In the eastern States, for example, while the eastern States contain 64 per cent of the large cities, they contain only 44 per cent of the mileage. The western States, however, contain six per cent of the cities above 15,000 inhabitants, and 16 per cent of the mileage; in other words, a very much larger proportion of mileage to the cities served than is found in the East. The central States have 19 per cent of the cities and 32 per cent of the mileage. The South has 11 per cent of the cities and eight per cent of the mileage. There is not so much over-building in that section, it would appear from the figures, as there is in the West; but there are one or two cities of the South which have suffered from considerable overbuilding. It may be said that while the western States contain six per cent of the cities, they have 10 per cent of the total capitalization of the country, while the eastern States have 64 per cent of the cities and 57 per cent of the capitalization. Now, over-building is a pretty bad thing for street railroads. It means not only the maintenance of track, but it means excessive car service. Suppose you have two parallel streets in a rather small city on which you have railroads, you can not give a five-minute service on both streets and live. The usual way of solving the problem is to give a 10-minute service on each street, which practically gives a five-minute service on each street, the cars being started every five minutes, considering the two lines as one. This, of course, implies a knowledge of schedules on the part of the public, and the minute you begin to talk about schedules of street railways people begin to walk. They

do not want to bother with schedules. If they know they can get a car by waiting five minutes they will do so; otherwise they will probably walk so far that when the car overtakes them they will not consider it worth while to ride the rest of the distance they intend going. This principle can be applied in many ways, and nothing more need be said upon this point.

When we come to transfers, we run across another series of difficulties all having at their root the inherent disposition of the American people to cheat a corporation. I had a transfer problem presented to me the other day which was very interesting. The business center of the town was so situated that the lines converged at that point, each coming from opposite directions. Ninety per cent of the traffic of that city simply comes in from the outlying sections to the business center and goes back again; sometimes it may be 95 per cent. In this case the street railway company estimates it at 90 per cent, at least. Now, if that company grants transfers, they are going to have difficulty. Many people will come in on a certain line, and take a transfer whether they require it or not, and will either dispose of the transfer to some storekeeper or make arrangements with some one to exchange them, and they will spend 15 minutes in doing it each day, so that the tickets may be used. Time is no object when it comes to saving five cents when a street railway company is the loser. Perhaps 10 per cent of these people want to go on these lines running out from the center of the city. If you have a transfer agent at this point, it means a great expense and many tickets will be given away to those who are not entitled to them. Many men make a daily practice of getting close to a car, and when it stops they slip in with the crowd and get a transfer ticket. A gentleman who was talking with me about this particular thing said that he made an investigation, to see what the transfer system in New York city amounted to, and he went to a certain point where they had an agent in the street, and he tried that little trick of going up with the crowd eight times in succession, and he got his transfer eight times and was not detected in doing so. It seems rather a hard thing for a city to compel a company in a case like that we are considering, to put a transfer system on for the benefit of 10 per cent of the people who ride on the cars. It necessarily means, in a case like that, where the number who want to transfer is so small, a large reduction in income, because of the loss and misused tickets; it means that a force has to be established to take care of transfers and check them up, or the conductors will dispose of them in saloons. These difficulties are hard to explain to the residents of a city through the press, and the press itself is oftentimes misled about them. It is a matter of conditions. Citizens of certain cities see that transfers are being granted in other cities. A few men may happen to want transfers to go to some point which can not be reached by a single fare, and they think it is a shame that they do not get them. Sometimes it is a good thing for the citizens and for the company alike that transfers shall be issued. Frequently, transfer systems are introduced with the idea of increasing the revenue, but it is a question of conditions, and conditions are so different in various cities that it is by no means a truism that all the cities ought to have the transfer system. There is one other feature of the traffic question which should be mentioned. In the thickly settled cities of the East, car speeds are small—necessarily small—because it is difficult to thread one's way through and among the cars and drays, etc., in the principal streets. In the West, there is not nearly so much of that obstruction, and car speeds are very much greater, and the car miles per day, or the mileage per day per car, is much greater. That has been the comparative salvation of many of the western roads—their ability to get more service out of their equipment and out of their car force—conductors and motormen—than can be done in the East. We find, frequently, that the western roads operate at 8 or 10 cents a car mile, whereas, in the East, 15 to 25 cents is the general run of expenses. It makes a great deal of difference whether you divide your expenses by 150 or 175 miles per car per day, or whether you divide them by 80 or 90 miles per car per day.

To pass from these general considerations to discuss very briefly a few of the financial conditions surrounding American street railways. In the first place, I think a definition of a correct financial system of an operating property is perhaps necessary. When a man invests $100 in a share of stock, he expects two things. He expects to get an annual return on that stock and he expects to get back his principal when he wants it, or at the end of the operating period. He takes his chances on the first, but he expects that the managers of a property will so conduct its affairs that, if it becomes at any time necessary to wind up the existence of the company, he will get 100 cents on the dollar for his investment. If a company is not able to do that, it is not operating on a correct financial system. If it pays out too much in annual return, and does not provide for contingencies which are likely to occur in any operating venture, trouble is likely to come. A correct financial system for the operation of the road is one where the investors are able, at the end of the operating period, at least, to obtain their full investment, and an annual return during the operating period, if a return is earned. Now that brings me to the subject of capitalization. I suppose that the old horse railroad systems prior to 1888 were capitalized very conservatively. I imagine there was very little water of any kind entered into their capitalization, with a few exceptions. In fact, I think that in a large proportion of the systems a good deal of the earnings were turned back into the property and not capitalized. It is impossible to tell whether that is so or not. At all events, capitalization per mile seems reasonable, and not excessive in any way. Now, when electricity came into the field, as I said before, there was an exaggerated idea of its value as a profit-earner.

(To be continued.)

Brooklyn Bridge Traction.

The sub-committee of the Brooklyn Bridge trustees, which has been considering the question of the compensation to be paid by the elevated and trolley railroad companies for the privilege of using the bridge, had another conference last week. An agreement was reached as to the amounts which the companies would be asked to pay, and Mayor Wurster and President Berri were directed to make a detailed report of the matter and submit it to the full board of trustees at its next meeting. Mr. Berri states that the proposed scheme would increase the bridge revenues from $300,000 to $350,000 a year.

ELECTRIC RAILWAY NOTES.

The Pittsburgh, Pa., Traction Company has declared a dividend of $1.50 per share on its preferred stock.

A dividend of one per cent has been declared on the stock of the Columbus, Ohio, Street Railway. Books closed April 20 and will reopen May 1.

An agreement has been perfected between the Brooklyn Heights Railroad Company and the Long Island Electric Railroad, of Brooklyn, N. Y., for an interchange of traffic facilities.

A bill has been drawn and will be introduced in the New York Legislature for the city to raise funds to purchase the Sixth and Eighth avenue street railway lines and afterwards sell the right to operate them at public auction.

At a special meeting of stockholders of the Holmesburg, Tacony and Frankford, Pa., Electric Railway Company, the following officers were elected: John T. Windrim, president; Frank Bell, vice-president; James Pollock, member of the board of directors.

The East St. Louis, Ill., Electric Street Railroad Company has reorganized as follows: Julius S. Walsh, president; E. P. Bryan, vice-president; C. K. Walsh, secretary, and F. C. Daub, treasurer. This meeting was held preparatory to a change of hands of the old East St. Louis line, better known as the Scullin line, to the St. Louis Terminal Association.

At a meeting of stockholders of the Braddock, Pa., electric street railway, the following officers were elected: E. B. Kimberly, president; E. V. Powell, treasurer; B. F. Quinn, recording secretary. These officers and D. Cubbage and F. E. Proctor are directors. The new charter has been received and the line will be extended on Main and Eighth streets to Talbot avenue.

Isaac W. Heysinger has filed a bill in equity in the United States Court against the Union Traction Company, of Philadelphia, Pa., asking to have the latter restrained from the making of an alleged infringement on the plaintiff's patented improvements in electric railways. It was stated by Joshua Pusey, counsel for Mr. Heysinger, that the patent sued upon is on the insulated sectional system for trolleys.

President A. R. Hart, of the Long Island Electric Railway Company, has announced that arrangements had been made with the Kings County Elevated Railroad Company for connection at Washington street, Jamaica, between the two systems. This will enable passengers on the Hart lines to go direct to Queens as soon as the line to that point is completed. The Far Rockaway line will be completed by June.

A certificate of incorporation of the Rapid Transit Underground Company, of New York city, has been filed with the Secretary of State, to operate from the City Hall to 155th street, via the Elm street boulevard route. The incorporators are C. H. Reeve, C. V. Sidell, John Bogart, Jno. Acker, D. S. Hough, J. F. O'Rourke, Thos. Allen and R. H. Sherwood, all of New York, and Nelson S. Easton, of Summit, N. J.

A. G. Wheeler, of the Love Traction Company, is authority for the report that the General Electric Railway Company, of Chicago, Ill., will begin shortly to lay rails and construct the conduits for its underground power cables in the 60 miles of streets surrendered to it by the City Council. The probable cost of the completed system of 60 miles will be something like $6,000,000, or $100,000 a mile for the roadbed and the equipment.

The Buffalo, N. Y., Traction Co., filed with the County Clerk its consent to a first lien upon all its property and franchises granted to the Central Trust Company, of New York, and dated January 1, 1897. The lien is given to secure the bonds of the traction company, not exceeding $5,000,000, to be issued at the rate of not exceeding $50,000 per mile of track actually constructed. The bonds are to be $1,000 each, payable in 40 years, and bearing interest at five per cent.

The Worcester & Marlboro Street Railroad Company, of Worcester, Mass., are erecting, at Northboro, Mass., a new power station. The engine room is 55 feet wide and 63 feet long, and the boiler room is 45 feet wide and 40 feet long. The roof, which is to be gravel on plank, is supported by steel trusses. Cutting & Bardwell, of Worcester, Mass., are the general contractors for the work, and the steel work will be erected by the Berlin Iron Bridge Company, of East Berlin, Ct.

A decision of the Wisconsin Supreme Court in the case of Northwest against the Racine & Kenosha Electric Railway Company has an important bearing on the rights of trolley companies. The court says that companies operating electric railroads can not make use of country roads or city streets for any purpose other than the transportation of passengers, without paying damages to the owners of abutting property. It was the contention of Northwest that the charter of the Racine & Kenosha company, whose line forms part of a road designed ultimately to connect Milwaukee and Chicago, conferred powers which placed it on the same footing as the steam railway companies and made it a possible competitor in all branches of the transportation business, while enjoying the privilege of free right-of-way over country roads, by virtue of being a street railway company. The Supreme Court makes a distinction between trolley lines intended solely for passenger traffic and those which may be used for freight and express purposes, on the ground that the operation of a commercial railway would tend to interfere with and obstruct the ordinary uses of a street or highway. The trolley company concerned in this case will have to amend its articles of incorporation, in order to proceed with the construction of its line.

American Transatlantic Telegraphy.

[*From London Engineering.*]

The American Commercial Cable Company appears to have come to stay. The undertaking originated in the necessity experienced by Mr. J. Gordon Bennett for obtaining cheap and abundant telegraphic matter from London every night for publication in the New York *Herald* on the following day. The American intelligence published daily in the great London journals is comparatively meager, but American newspaper men go in heavily for European cablegrams, and Mr. J. Gordon Bennett was anxious, of course, to maintain the reputation of the New York *Herald* for pre-eminent enterprise. Calling to his aid Mr. Mackay, of San Francisco, he accordingly established a new Atlantic telegraph undertaking. When the new line was brought into effective operation it was seen that it must go in for general telegraph business between the Old and the New World, in order to become a success. It embarked, in fact, in a competition with the Anglo-American Telegraph Company, Limited, and it has gradually grown in importance until it has now acquired the property of the Postal Telegraph-Cable Company, of the United States. The Anglo-American Telegraph Company, Limited, thought it had made a good stroke when it established intimate relations with the Western Union Telegraph Company, and the latter has been buying up competitors of all kinds for the last 30 years. It is a fruitless task, however, to endeavor to extinguish American competition, as no sooner is one company absorbed than another presents itself. The capital stock of the Commercial Cable Company stood, at the close of 1896, at $10,000,000, and the dividends for 1893, 1894 and 1895 amounted to $700,000 in each year, while for 1896 they rose to $800,000. In other words, the proprietors received last year a return upon their capital at the rate of eight per cent per annum. The net revenue of the company amounted in 1893 to $1,057.747, in 1894 to $1,010,438, in 1895 to $1,215,308, and in 1896 to $1,176,565. The increase in the amount distributed in dividends last year was due to the declaration of a bonus of one per cent, in addition to four quarterly dividends of one and three-quarters per cent per annum. After paying these dividends the company was enabled to carry forward a balance of undivided profits of $846,678. The reserve fund was also increased last year to the extent of $250,000; this sum was invested in first mortgage bonds of the Commercial Cable Building Company, secured by valuable real estate in New York. The amount standing at the credit of the reserve funds at the close of 1896 was $2,041,821. The gross revenue of the company increased last year to the extent of $9,518, but the working expenses were more by $48,350. This increase in the working charges was principally attributable to cable repairs, eight repairs having been carried out during 1896, as compared with five during 1895.

The growth of the net profits, the steady increase of the reserve funds, and the acquisition of the undertaking of the Postal Telegraph-Cable Company, are all proofs that we are justified in our observation that the Commercial Cable Company has come to stay. The fact that its accounts were audited last year by an English firm of accountants would even appear to indicate an intention on the part of the board to attract as much English capital as possible into the concern. It is doubtful, however, whether English investors will take very kindly to the Commercial Cable Company, as it is tolerably certain that it is regarded as an intruder into a field of enterprise which English capitalists have come to regard very much as their own. But however this may be, the Commercial Cable Company is certainly the most persevering and the most carefully administered American Atlantic telegraph company with which the Anglo-American Telegraph Company has ever had to contend. The English company crossed swords in its day with the redoubtable Jay Gould, but he was soon bought up. The Paris & New York Telegraph Company has also not been a particularly serious opponent; but the Commercial Cable Company is a different kind of affair altogether. Notwithstanding the competition of the Commercial Cable Company, the prospects of the Anglo-American company have, however, been slightly improving of late years, although the position of the concern still leaves a good deal to be desired. The dividend upon Anglo-American ordinary stock for 1893 was at the rate of £2 11*s.* per cent; for 1894, £2 2*s.* per cent; for 1895, £2 9*s.* per cent, and for 1896, £2 13*s.* per cent. The preferred ordinary stock received exactly double these amounts during the four years, but the deferred ordinary stock has received nothing since February, 1885. While the nominal capital of the Commercial Cable Company is £2,000,000, that of the Anglo-American company is £7,000,000. The amount distributed in dividends by the English company in 1896 was £185,498, while the corresponding amount paid away by the Commercial Cable Company was £160,000. It would thus appear that, with a capital of less than one-third, the Commercial Cable Company earns nearly as large an annual profit as that secured by the Anglo-American company. The hope for the Anglo-American company is to be found in the tendency which telegraphic business has to gradually increase between the two worlds. That this tendency is real and substantial is seen in the fact that the Commercial Cable Company has been enabled to make a good business for itself without, at the same time, absolutely crippling the Anglo-American company, while the latter has been picking up, rather than otherwise, during the last three or four years. This recuperation of the Anglo-American company is rendered all the more remarkable by the fact that, since 1893, the United States have been contending with difficulties of the gravest character. As the great West fills up and regains its prosperity by depending less exclusively than hitherto upon agriculture, transatlantic telegraph business ought certainly to become more remunerative, and the Anglo-American company may gradually recover the prosperity which it formerly enjoyed, unless, indeed, it has to compete with some new rival. The Commercial Cable Company appears to have no renewal fund. It has, however, built up a reserve fund of $2,042,821, while deference has further been paid to American commercial practice by the accumulation of undivided profits to the substantial further amount of $846,678. In one way or another the company has, accordingly, reserves to the aggregate amount of $2,889,499 with which to face any eventuality. The addition made to the reserves during 1896 was $626,565, so that the affairs of the undertaking are being administered in a spirit of commendable prudence. This is as it should be, as all past experience shows that transatlantic cables, whether British or American, will certainly not last forever.

WESTERN NEWS NOTES.

ITEMS OF INTEREST FROM CHICAGO AND MILWAUKEE.

Mr. Geo. D. Sturtevant, the energetic representative of the Adams-Bagnall Electric Company, passed through Chicago last week, having just returned from Dayton, Ohio, where he secured an order for 75 of the A.-B. 100-hour lamps.

Mr. John S. Maurer, the able representative of the Crouse-Tremaine Carbon Company, was in Chicago last week booking several nice orders for his company's products. Mr. Maurer reports quite a demand for motor brushes, in which line the company is fast gaining an enviable reputation.

The Harrison International Telephone Company, Chicago, reports a decided improvement in business during the past few weeks, so much so that an additional force of men had to be put in the shops, in order to keep up with the orders. In addition to furnishing complete exchange and private line outfits, the company has quite a trade in telephone parts among the smaller dealers. Reno, Neb., is among the recent places heard from, with an order for 150 'phones, according to Mr. Parrish.

Keelyn & Smith, the electrical contractors of Milwaukee, have been obliged to find larger and more convenient quarters in order to take care of their constantly increasing trade. They will, after May 1, be located at 169 West Water street, where they not only will have more space, but at the same time be more within the business district. In addition to being general agents for Fort Wayne apparatus and the products of the Card Electric Company, they have just received a large shipment of Paragon fan motors, orders for which are coming in with increased frequency each day.

It seems that nothing now stands in the way to interfere with the building of the General Electric Street Railway, a permit to begin the work of construction having been granted by Mayor Swift on the 13th instant. It is said the company will advertise for bids for the work within a few days, and that the general scheme of construction has been decided upon. It is expected that the greater portion of the road will be finished before the construction season is over, as the contract will be let by sections to different contractors. Nothing but the underground system will be used. The route has already been given in previous issues of the ELECTRICAL REVIEW.

A committee of seven aldermen is about to be appointed by the Mayor of Chicago, which will compose the Street Railroad Commission, in accordance with an ordinance passed by the City Council last week. The purpose of establishing the special committee, or commission, is to have it receive and investigate complaints of citizens regarding the service given the public by the street railroad companies, and to compel the corporations to carry out to the letter the provisions of their franchises. The committee will have permanent headquarters in the City Hall, and its office will be open every day. Two members of the committee will be from the North Side, two from the South Side and three from the West Side. A record will be kept of the protests which passengers make against the service of the company.

Jul. Andrae & Sons' Company—The name Andrae has been so long and favorably known to the electrical trade that the mere mention of it calls to mind good engineering work, good apparatus, good supplies and the Andrae cycles, that never disappoint. The manager of the electrical department says that in that line business is most decidedly improving; in fact, the company has been pretty busy all last Winter equipping some of the Flint & Pere Marquette line steamers, and is now finishing the wiring of Boat No. 5 on that line. Among the larger isolated plants recently equipped by the Andrae company may be mentioned that of the Waupun prison. The company also has quite a large department devoted to the telephone business exclusively, and is furnishing private line and exchange apparatus that, like the Andrae cycle, never disappoints.

C. E. K.

Louisville, Ky., Street Railway News.

The Metropolitan Railway Company, of Louisville, Ky., has been incorporated with $1,000,000 capital to operate cars by the underground electric system, storage battery or compressed air. The proposed line will extend 150 miles and will traverse 71 streets in Louisville.

J. G. White & Company, Incorporated.

In another part of this issue of the ELECTRICAL REVIEW will be found the announcement of a new corporation, although the title by which this is to be known has been familiar to the electrical fraternity for some years. The official title of the new corporation is "J. G. White & Company", and has been organized under the laws of the State of New York, with a fully paid cash capital of $100,000. It succeeds to the business of the White-Crosby Company, of 29 Broadway, New York, and of Baltimore, which business was formerly conducted by J. G. White & Company, in which firm the "Company" was nominal.

When the White-Crosby Company was organized, it was planned that Mr. Oscar T. Crosby, who had severed his connection with the General Electric Company, in order to participate in the business of the new corporation, would be able to devote a large portion of his time to the affairs of the company with which his name was associated.

About the time the new company was organized, the very arduous work that Mr. Crosby had been doing for the General Electric Company and the Thomson-Houston Electric Company necessitated a vacation, and, consequently, Mr. Crosby decided to take a trip to Europe, in order to gain some rest and recuperate from his long period of overwork.

After returning to this country, Mr. Crosby felt a disinclination to spend much of his time in the rough life incident to almost all branches of the electrical business. In order to avoid this life of unrest, Mr. Crosby decided to become more largely interested in local properties, and with this end in view, he and Mr. Charles A. Lieb acquired a controlling interest in one of the smaller street railways in Washington, D. C., and later organized a power and lighting company, which latter has grown into a large and flourishing institution.

This and other local interests have gradually absorbed all of the time and attention of Mr. Crosby, so that for some months he has been unable to give any attention whatsoever to the affairs of the White-Crosby Company.

Those in control of the latter company concluded that its best interests would be subserved by forming a new organization under the laws of the State of New York, instead of under the laws of the State of West Virginia, where the company had originally been incorporated, and also by increasing its capital stock.

In reincorporating it was finally, after mature deliberation, decided that as Mr. Crosby had voluntarily withdrawn from active participation in the business of the company, any chance of confusion as to the exact status of the company would probably be lessened by adopting the name under which the business of the concern had been carried on prior to the date of the incorporation of the White-Crosby Company.

Mr. J. G. White, president of White-Crosby Company and of J. G. White & Company, Incorporated, was graduated at Pennsylvania State College in 1882, and having obtained a second degree (Ph. D.) at Cornell University in 1885, taught physics in the University of Nebraska for two years. At the end of this time (1887) he formed the Western Engineering Company, with headquarters at Lincoln, Neb. In this enterprise he was joined by Mr. D. C. Jackson, now professor of electrical engineering at the University of Wisconsin, and Mr. Harris J. Ryan, now professor of electrical engineering at Cornell University. This company was sold to the United Edison Manufacturing Company in the Spring of 1890, Mr. White at the same time making an agreement with the Edison company to be its exclusive agent, on a commission basis, for the United States, in making contracts for the construction and equipment of electrical railways.

During the Summer of the same year the Edison General Electric Company was formed. All agents and employés of the company were put on a fixed salary basis, and all commission arrangements were abolished. In view of this change of policy Mr. White considered it expedient to decline the salaried position which was offered him, and to begin business in New York on his own account. This was done in the Fall of 1890, and the business then started was conducted continuously until the formation of the White-Crosby Company, in May, 1894.

This firm, under the various titles above mentioned, has equipped a considerable portion of the electrical railways of the country, having had contracts in Spokane, Wash.; Salt Lake City, Utah; Sherman, Tex., and in many cities and towns between these far-away points and the New England coast.

During the last five years the contract work done in Baltimore alone has aggregated some $3,000,000, and many other contracts have been carried to a successful completion. Among the more prominent of the recent contracts was the bulk contract for the Buffalo & Niagara Falls Electric Railway, and the contract for the transmission line complete, a few months ago, for the Cataract Construction Company, for carrying Niagara Falls power into the city of Buffalo.

The company has, at the present time, contracts for the complete construction and equipment of the street railways of Charleston, S. C., including all buildings, power plant, track, overhead equipment and other details; the changing of the "Blue Line" of the Baltimore City Passenger Railway Company from cable to trolley; the electrical engineering for a large transmission plant to be located near Helena, Mont., power for which is to be obtained from the Missouri River; the building of extensions for the Norwalk Tramway Company, Norwalk, Ct., as well as other similar work.

As will be seen from the above, Mr. White was among the first in the electric railroad construction business, and the new corporation will have the benefit of his long and varied experience and of his well established reputation for first-class construction, careful and intelligent attention to details and fair dealing. It is, therefore, to be expected that the new corporation will enjoy, at least, a fair share of such business as may be done within the lines in which it expects to operate.

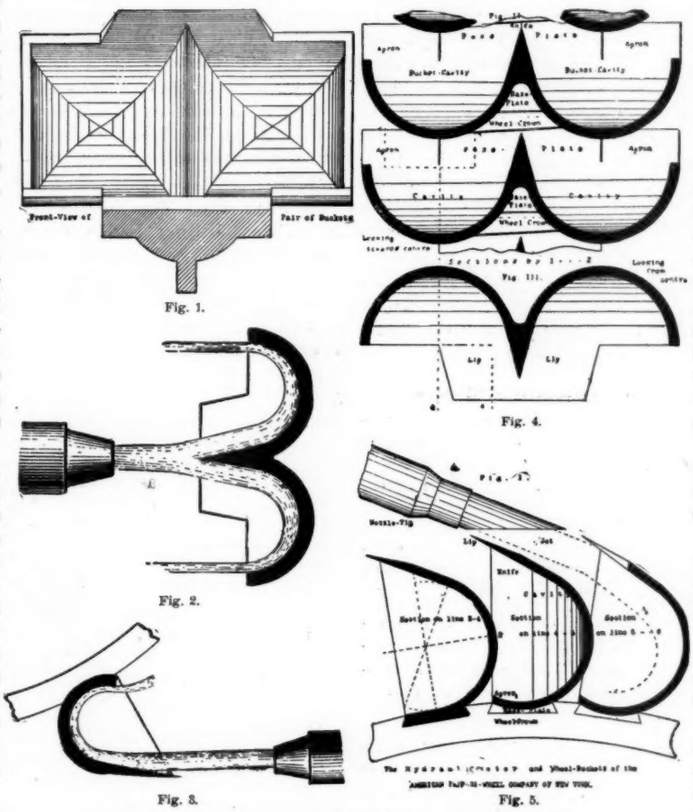

Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.

DIAGRAMS ILLUSTRATING THE CAZIN STEAM AND WATER WHEEL.

THE CAZIN STEAM AND WATER WHEEL.

NEWEST DEVELOPMENT OF PERCUSSION WHEELS.

The subject of the utilization of water power, which is becoming of such importance, and which might be said to be still in its infancy, so far as this country is concerned, has received additional matter in the shape of a pamphlet just distributed among civil, mechanical and electrical engineers, generally throughout the United States, by the American Impulse Wheel Company, of New York.

The invention described in the publication referred to is a wheel of the free-jet or percussion type (operated by either steam or water), which is claimed to go beyond anything of the sort hitherto known to the mechanical world, in developing maximum efficiency of the motive power.

It is an established fact in hydraulics that the jet of water must be completely inverted by the vane or bucket of a wheel, traveling at half the velocity of the jet, in order to obtain the best results in transmitting the inherent power of the jet. It is unnecessary to quote authorities in support of this theorem. But it is of interest to note the claims of this new wheel company in complying therewith. The accompanying engravings indicate more clearly than verbal explanations the basis for the assertion that the wheel actually performs the work theoretically required.

Fig. 1 shows a front view of a pair of buckets, in which the curves of the receiving lip and vanes are indicated by the shaded lines.

Figs. 2, 3 and 4 show sections of the vanes, showing not only the true curves, but also the course of the jet in contact therewith.

Fig. 5 finally shows the positions of the vanes on the wheel crown, and also the diagonal nozzle tip intended to provide against loss of power between the time the jet leaves the nozzle and contact with the buckets.

These diagrams show the pertinent facts of the merits of the device, and it is claimed and demonstrated, in the pamphlet referred to, that the jet is not only inverted while the bucket is in its best position relative to the jet, but also completely and permanently in all positions taken by the bucket while receiving the jet impact—a necessary condition to highest efficiency, frequently overlooked by wheel manufacturers. In addition to these brief items, the book contains considerable information relating to power calculations, hydraulics, water rights and other matters, part of which has appeared in the "Journal of the Franklin Institute" and various engineering publications. The invention is covered by patent rights issued to F. M. F. Cazin, inventor, and is offered for sale by the American Impulse Wheel Company, 120 and 122 Liberty street, New York, who will furnish copies of the book upon application.

ADVANCE INFORMATION

Electric Light and Power.

PORT LAVACA, TEX.—An electric light plant will probably be installed in the Bay View Hotel.

CONSTANTINE, MICH.—H. W. Francisco, Village Clerk, may be addressed concerning lighting of streets by electricity.

NORFOLK, VA.—The Norfolk Light and Power Company has been incorporated by William Roseborough, president; W. H. Minor, vice-president, and A. E. Krise, secretary, to furnish electric lights, etc.

LANCASTER, TEX.—Address Mayor concerning establishment of electric light plant.

BROOKINGS, S. D.—An electric light plant will be put in at the Agricultural College, to light the buildings and furnish electricity for mechanical and scientific purposes.

REDWOOD FALLS, MINN.—The Western Supply Company, of Chicago, has been awarded contract for erecting electric light plant at Redwood Falls, at cost of $7,000.

AUSTIN, TEX.—The Hempstead Artesian Water Company amended its charter recently by increasing its purpose to supply light and ice.

EDGEWATER, N. Y.—A franchise has been granted to the New York & Staten Island Electric Company to light the streets of this village.

EXETER, N. H.—The contract for street lighting has been awarded to the Rockingham Electric Company, at $78.50 per light per year.

BAR HARBOR, ME.—Work on a new electric light station at this place will be begun in August. It will be built of brick, with concrete floor and iron roof, and will cost in the neighborhood of $7,000.

DUNKIRK, N. Y.—Wellsville has voted to raise $1,000 for electric lights and $350 for park improvements.

ROCK RAPIDS, IOWA—The contract for building an electric lighting plant at Rock Rapids has been let to the Bigelow Electrical Supply Company, of Lincoln, Neb.

OWENSBORO, KY.—The Marsden Development Company has awarded Joseph McWilliams, of Louisville, contract for the erection of a 750-horse-power plant for power, heat and light for its cellulose factory, now building.

BROOKLYN, N. Y.—The Amsterdam Electric Light, Heat and Power Company has been incorporated, with a capital of $500,000. The company will operate in Brooklyn and other places. The directors are Frank G. Writer, Edward J. Prest, of New York city, and Henry Heale, of Brooklyn.

EDENTON, N. C.—City Clerk may be addressed concerning establishment of electric light plant.

EUTAW, ALA.—An electric light plant will be established.

NEW HAVEN, CT.—The North Haven Electric Light Company has received permission to incorporate, and will commence work on the erection of its electric light plant.

NEW YORK, N. Y.—The Standard Incandescent Gas Light Company has been incorporated by Theodore Tietz, Harry Jennings, Samuel Bernheim, John J. Kant and Henry Hollies; capital stock, $20,000.

STONY BROOK, L. I., N. Y.—Thomas N. Bayles will establish an electric light plant.

REDWOOD FALLS, MINN.—The contract for erecting the electric light plant, etc., has been awarded to the Western Supply Company, of Chicago, by A. C. Burmeister. The plant is to be ready for operation by June 15.

GEORGETOWN, COLO.—The Georgetown council has instructed the Water and Light Committee to make a contract with the electric light company for one 1,600-candle-power arc light to be placed in the City Park, and 50 16-candle-power lamps for lighting the city.

OPELOUSAS, LA.—The contract for the construction of a system of waterworks and electric lights has been awarded to B. F. Rounds, of Texas.

SAN FRANCISCO, CAL.—A 75-horse-power electric power plant will soon be erected at the Hidden Treasure mine, Placer County.

New Electric Railways.

PARIS, KY.—A company will probably be formed to build an electric line.

BALTIMORE, MD.—The Falls Road Electric Company, George R. Webb, Equitable Building, general manager, will commence work on its trolley road to Mount Washington.

WEBSTER CITY, CT.—The Electric Street Railway Company contemplates an extension from Grosvenordale to the different villages in Webster.

CINCINNATI, OHIO — Extensive plans for increased electric railway facilities for Norwood are now under consideration by the Cincinnati Street Railway Company. An electric line will be run from the intersection of Reading Road and Dana avenue across Montgomery Pike, via Dana and Langdon avenues.

OBERLIN, OHIO—Lorain County commissioners to-day granted the Cleveland & Elyria Electric Road Company a franchise to build their road to this place. If they are granted a franchise by the Oberlin council the work of construction will begin at once.

ASBURY PARK, N. J.—The Atlantic Coast Electric Railway Company, which is controlled by the Crimmins syndicate, of New York, is endeavoring to extend its trolley road from this place to Belmar, where it will connect with the projected road from Belmar to Point Pleasant, and make a continuous line from the latter resort to Pleasure Bay, a suburb of Long Branch.

GREENBUSH, N. Y.—The Greenbush & Nassau Electric Railway has applied for franchise to construct and operate a line between this point and Nassau.

LEWISTON, ME.—A strong movement is on foot, backed by local capital, to build an electric road from this city to Mechanic Falls and Oxford.

BELLEVILLE, MO.—The Belleville Electric Railway Company has been granted the right of way to extend its tracks from the southern city limits of this place to Walnut Hill Cemetery.

NORTH MILWAUKEE, WIS.—A petition is being circulated at this place, asking the Milwaukee Electric Railway and Light Company to extend its lines to that place.

EAST DEDHAM, MASS.—A petition in being circulated at this place in opposition to the proposed extension of electric street railway tracks through Walnut street and Oakdale avenue to River street, Oakdale.

BRANFORD, CT.—A company is petitioning for the right to construct and operate an electric line in Branford.

CHICAGO, ILL.—The North Shore Inter-Urban Railway Company has been incorporated with a capital stock of $340,000. The new line will be operated by electricity, and will connect the northern suburbs, Waukegan and Highland Park.

PITTSBURGH, PA.—The Pittsburgh & Mt. Washington Railway has been granted franchise to construct a line.

PAINESVILLE, OHIO—The Lake County commissioners have granted to Charles H. Moody the franchise to build and operate an electric railroad between this place and Fairport.

HOBOKEN, N. J.—A franchise has been granted to the North Hudson County Railway Company to operate trolley cars on various lines in the city.

New Telephone and Telegraph Companies.

MCCOMB CITY, MISS.—W. M. White and J. W. Johnson, of Whitestown, Miss., will establish a telephone system in this place.

BRUNSWICK, GA.—W. N. Cheney, of Jacksonville, Fla., will establish telephone system and exchange in Brunswick.

FORT SMITH, ARK.—The Pan Telephone Company has been incorporated by L. E. Ingalls, W. H. H. Clayton and J. Brizzolara. Capital stock, $15,000.

UTICA, N. Y.—Utica Telephone Company has been incorporated to operate in Utica and other places in Oneida County; capital stock, $100,000. Directors, William Clark, of Fort Plain; William H. Claher, Charles W. Mather and Bordman L. Fitch, of Utica; Elmer E. Summey, of Amsterdam, and Isaac J. Evans, of Rome.

DANVILLE, KY.—The East Tennessee Telephone Company has completed arrangements for the extension of its metallic circuit, long-distance service to Danville, which will give this city perfect communication with all principal cities. The line will come from Frankfort, via Lawrenceburg and Harrodsburg. The company will also run a wire between Danville and Stanford, and this will complete the circuit between the four or five leading towns in this portion of Kentucky.

NORTH TARRYTOWN, N. Y.—A franchise has been granted to the Westchester Avenue Telephone and Telegraph Company to construct and operate an electric system in the village.

CAMBRIDGE SPRINGS, PA.—The Cambridge Springs Electric Telegraph and Telephone Company has been incorporated, with a capital stock of $10,000.

ASHLAND, OHIO—The People's Telephone Company is extending its line from here to Medina.

CANTON, ILL.—The Lewis County Telephone Company have 60 miles of line in operation, and are building a line from Monticello to Lewistown. They now have telephone connection with all the towns in adjoining counties. Canton will have a telephone exchange in operation in 30 days.

BOULDER, COLO.—The telephone company at this place is making some material repairs and improvements in its system.

STAR VALLEY, UTAH—A scheme is on foot to build a telephone line from this place to Montpelier. Afton men are behind the venture, and it is intended to put up the poles and string the wires as soon as Spring opens.

New Incorporations.

WINSTON, N. C.—The Fries Manufacturing and Power Company has been incorporated, with H. W. Fries, president; C. H. Fogle, vice-president, and J. W. Fries, secretary and treasurer, to establish an electric plant on the Yadkin River, 15 miles from here, to supply Winston-Salem with electric power. Capital stock, $60,000.

NEW YORK, N. Y.—The United States Battery Company has been incorporated to manufacture and deal in electric batteries, machinery, etc. Capital stock, $25,000. Directors, Albert C. Johnson, Lilian H. Andrews, Henry P. C. Johnston, Owen T. Bugg and Adolphus L. Helwig.

CAMDEN, N. J. — The Camden Medico-Electrical Appliance Company has been incorporated to conduct a general electrical supply business. The capital stock is $25,000. The corporators are John W. Welsh, of New York city; Walter F. Smith, J. D. Nevins and N. S. Keay, of Philadelphia, and George W. Ring, of Camden.

The Electrical Burglar.

Mr. Henry Romeike, the well known literary man, in referring to Mr. Carl E. Kammeyer's interesting article on "The Modern Burglar", which appeared in the ELECTRICAL REVIEW for March 17, 1897, says:

"Your article is attracting a great deal of attention, and is widely commented upon and reviewed."

Kindred.... ...Interests

Mr. Luther Stieringer has removed his offices from the Morris Building, in Broad street, to the new Beard Building, 120 Liberty street, New York city.

It is said that the new X-ray apparatus now in course of completion at the Spring Park Laboratory, Jamaica Plain, Mass., under the direction of Professor T. B. Kinraide, permits a person to stand with the back to the Crookes tube, and with the fluoroscope examine his own anatomy.

The B. & O. Railroad has made two important lake connections, one to Duluth and the northwest, via Northern Steamship line, and the other to Chicago and Milwaukee, via the Owen line, through Fairport, Ohio. Fairport is the Lake Erie terminus of the Pittsburgh & Western Railroad, which, as is well known, is practically a B. & O. property, although under separate management.

A Presidential Car—The *Railroad Car Journal*, a publication devoted to the car-building industry, has originated a project to build a private car for the use of the President of the United States, from material and appliances contributed for the purpose by the car-building and affiliated industries. It is proposed to construct a private car, excelling anything of this kind which has been done before, in the substantial character of its construction and in the completeness and convenience of its furnishings and decorations.

The American Engine Company, of Bound Brook, N. J., seem to be enjoying quite a boom under the management of Mr. Frank H. Ball. Since the first of the year it has been found necessary to increase the capacity of their works, and now they are installing a regular all-night working force, so that their establishment will run night and day hereafter. Among the recent shipments they report the following :

Cincinnati *Commercial Tribune*, one 18-kilowatt dynamo.

Cliff Paper Company, one 50-horse-power motor, one 25-horse-power motor.

Daily States Publishing Company, one 12-horse-power motor.

Toledo *Blade*, one 12-horse-power motor.

Cleveland *Plain Dealer*, one 25-kilowatt dynamo.

Bridgeport *Post*, one 9-kilowatt dynamo.

Rochester *Times*, one 12-horse-power motor.

Daily and Weekly *News*, one 25-horse-power motor.

Baton Rouge *Advocate* one 5-horse-power motor.

Hartford *Post*, one 25-horse-power motor.

Kansas *Farmer*, one 12-horse-power motor.

The Register company, one 15-horse-power motor.

Syracuse *Standard*, one 9-kilowatt dynamo.

The St. Louis *Star*, one 50-horse-power motor.

Weaver–Costello company, one 9-kilowatt dynamo.

Minneapolis *Journal*, one 14 by 12 American–Ball engine.

Pennsylvania Silk Company, one 10 by 10 American–Ball engine.

Vacation Days.

In the Lake Regions of Wisconsin, Northern Michigan, Minnesota, Iowa and South Dakota, along the lines of the Chicago, Milwaukee & St. Paul Railway, are hundreds of charming localities, pre-eminently fitted for Summer homes, nearly all of which are located on or near lakes which have not been fished out. These resorts range in variety from the "full dress for dinner" to the flannel-shirt costume for every meal. Among the list are names familiar to many of our readers as the perfection of Northern Summer resorts. Nearly all of the Wisconsin points of interest are within a short distance from Chicago or Milwaukee, and none of them are so far away from the "busy marts of civilization" that they can not be reached in a few hours of travel, by frequent trains over the finest road in the Northwest—the Chicago, Milwaukee & St. Paul Railway. Send a two-cent stamp for a copy of "Vacation Days", giving a description of the principal resorts, and a list of Summer hotels and boarding houses, and rates for board, to Geo. H. Heafford, G. P. A., Chicago, Ill.

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3 M. P. 500, 666 horse-power, 500-volt generators with station equipments.
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4 M. P. 75, 100 horse-power, 500-volt generators with station equipments.
1 D 50, 55 horse-power, 220-volt generator with station equipment.

RAILWAY MOTORS.

10 W. P. 50, 25 horse-power motors.
15 F. 30, 15 horse-power motors.
20 G. E. 800 drum armatures, 4 turn. New.

STATIONARY MOTORS.

1	1½	horse-power,	110-volt,	Thomson-Houston.
1	1½	"	220 "	Robinson-Foster.
2	½	"	220 "	Edison.
1	3	"	220 "	Edison.
1	3	"	220 "	Thomson-Houston.
1	15	"	220 "	Belknap. New.
2	1	"	500 "	Ketchum. New.
1	5	"	500 "	Eddy.
1	5	"	500 "	C. & C.
1	¾	"	110 "	Thomson-Houston.
1	3	"	110 "	Thomson-Houston.
1	1¾	"	220 "	C. & C.
1	5	"	220 "	Am. Eng. Co. New.
1	50	"	220 "	Thomson-Houston.
1	10	"	500 "	Edison.

And many other motors not mentioned above.
All motors have sliding base frames and fire-proof rheostats.

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4	6	Kilowatt,	110-light,	Edison.
3	12	"	210 "	"
1	15	"	270 "	"
2	20	"	360 "	"
1	30	"	540 "	"
1	7½	"	125 "	T.-H.
1	3	"	55 "	"
1	8	"	125 "	" "C. I."
1	16	"	275 "	" "E. I." type.
1	25	"	450 "	Edison.
3	30	"	540 "	T.-H. "H. I." "
1	1,000-light	M. P.,	Westinghouse.	

ALTERNATING DYNAMOS.

1	A 35,	650-light,	Thomson-Houston.
1	A 70,	1,300 "	"
2	650-lights,	Westinghouse.	
2	750 "	"	
1	1,500 "	"	
3	1,000 "	"	

The above are all 1,000-volt machines, and are complete with exciters and station equipment.

ARC DYNAMOS.

1	5-light,	2,000	candle-power,	Brush.
1	5 "	1,200	"	"
1	20 "	2,000	"	"
4	30 "	2,000	"	"
1	45 "	1,200	"	" New.
1	65 "	2,000	"	"
2	50 "	2,000	"	Thomson-Houston.
4	45 "	1,200	"	"
1	80 "	2,000	"	"
2	30 "	1,200	"	"
1	75 "	1,200	"	"

ARC LAMPS.

15 K. 12, 1,200 candle-power, single, Thomson-Houston.
10 1,200 candle-power, single. Brush.
27 No. 17, 1,200 candle-power, double Brush.

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[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED APRIL 13, 1897.

580,380 Supporting means for electric railway supply conductors; H. P. Davis, Pittsburgh, Pa.—A support for cross-over and branch conductors for electric railways, comprising a plate provided with a plurality of radial grooves, a cap plate and means for clamping the conductors between said plates.

580,381 Supporting means for electric railway supply conductors; H. P. Davis, Pittsburgh, Pa.—Consists of a bar, having a longitudinally grooved upper edge and a curved lower edge, and provided at one side, substantially midway of its ends, with a perforated ear, the perforation in said ear and the groove in said bar being in substantially the same horizontal plane.

580,384 Electrical indicating wattmeter; T. Duncan, Fort Wayne, Ind.—A plurality of field coils, arranged in the form of a parallelogram, and having the magnetic axes of the opposite coils out of alignment, whereby an inclosed pivotally mounted volt coil will be oscillated or actuated by said field coils.

580,428 Electrode for secondary battery; F. W. Schneider, Triberg, Germany—A supporting frame, electrodes supported thereby, consisting of carriers having a perforated top, and an imperforate bottom, and an open-top, trough-shaped receptacle within the same supporting the active material.

580,434 Telephone transmitter; A. Stromberg, Chicago, Ill.

580,457 Electric hoist; J. A. Lounsbury, Chicago, Ill.—Consists of a motor frame, an annular form having an integral extension or neck, providing a bearing for a countershaft, and a terminal portion providing a bearing for a sheave shaft.

580,475 Electric riveting apparatus; E. Thomson, Lynn, Mass.

580,490 System of constant-current generation and regulation; T. H. Hicks, Detroit, Mich.—Consists of two electrical generators with a work circuit, each of said generators having two sets of field magnet coils; one field coil of each generator and the work circuit being connected in linear series with each other, one field coil of each generator being arranged in multiple arc with the work circuit, and the field coil being supplied with current from the other generator.

580,497 Galvanic battery element; G. Laura, Turin, Italy—The herein described diaphragm, consisting of a paste composed of a pulverized plant of the order of Malvaceoe, and a conductive substance, as a solution of sodium chloride.

580,519 Circuit controlling apparatus; F. M. Brinckerhoff, Matteawan, N. Y.

580,524 Galvanic battery; R. W. Gordon, Boston, Mass.

580,557 Electric headlight; R. F. Schwerin, San Francisco, Cal.

580,584 Art of insulating electric conductors; A. J. Robertson, Chicago, Ill.—Consists first in hermetically inclosing an electric conductor in a hollow conduit, then drying the air in said conduit by means of unslaked lime, and of exhausting the air in said conduit.

580,586 Aerial advertising device; P. A. Tomey, Chicago, Ill.

580,598 Electric locomotive; W. S. Elliott, Pittsburgh, Pa.—A truck frame, comprising an upper motor and car-supporting framework, and friction driving mechanism supported upon the wheels, and a lower framework, provided with housings and car-axle boxes, mounted in the housings, means for adjusting the housings toward or from each other.

580,617 Printing telegraph; H. Kreusler, Kreischerville, N. Y.

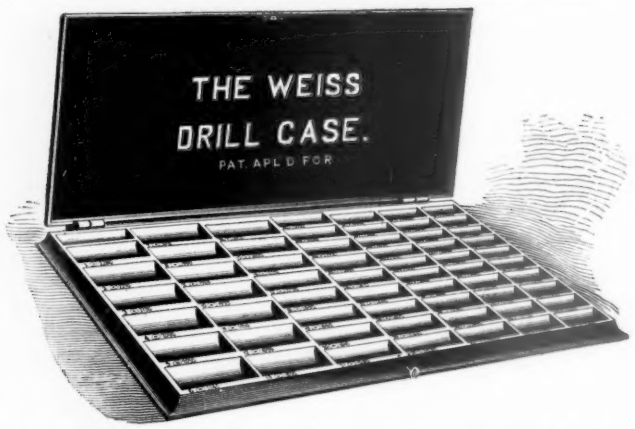
580,628 Insulator and insulating conduit or tubing for electrical purposes; F. G. Treharne, Llanishen, England—Consists of silicates impregnated with an electrically-non-conducting cement.

580,657 Non-inductive adjustable carbon resistance; S. P. Blackmore, Johannesburg, S. Africa.

580,663 Means for controlling electric currents; E. Ellicott, Chicago.

580,734 Electric arc lamp; A. C. Seibold, Mount Vernon, N. Y.—An arc lamp having the electrodes around the arc inclosed in a small transparent or translucent normally air-tight casing, said casing being provided at one or both of its ends with closures engaging the electrodes, one or both of which constitute valves.

580,820 Electro-magnetic locking device; E. J. M. Scheeren, Denver, Colo.



The Weiss Drill Case.

Any one who has ever hunted around for that particular drill or drill gauge desired at the time will appreciate the drill case manufactured by Weiss Brothers, 286–290 Graham street, Brooklyn, N. Y., illustrated herewith. The case has 60 round-bottomed receptacles, numbered consecutively. Receptacle No. 1 holds 16 and No. 60 holds about 200 drills. The case is also a drill gauge having hardened and accurately ground bushings opposite each receptacle. It gives the size of each drill in decimals opposite each bushing. The exact size of drill to use for all standard taps may be learned instantly.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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